FACILITY DESIGN SAFETY FEATURES
AND
EMERGENCY RESPONSE PLANNING
(On-Site and Along the Access Routes)

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SAFETY
AND OWMC'S
PROPOSED WASTE TREATMENT FACILITY

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SAFETY AND THE OWMC WASTE TREATMENT FACILITY

1.0 INTRODUCTION

The purpose of this document is to describe the safety features and programs of the design and operation of the proposed OWMC Waste Treatment Facility.

OWMC was created by the Government of Ontario in 1981, with the task of selecting a site(s), designing, constructing, and operating a facility for the treatment and disposal of liquid industrial and hazardous wastes generated in Ontario.

The preferred site for such a facility was selected in September 1985, and since that time, site verification and assessment studies have been conducted confirming its suitability. The site is located in the Township of West Lincoln at the intersection of Highway 20 and Schram Road (Figure 1).

The monitoring of existing environmental conditions has begun, and will continue on into Facility construction and operation phases. The monitoring of existing conditions will establish a baseline from which potential changes due to the OWMC Facility, can be

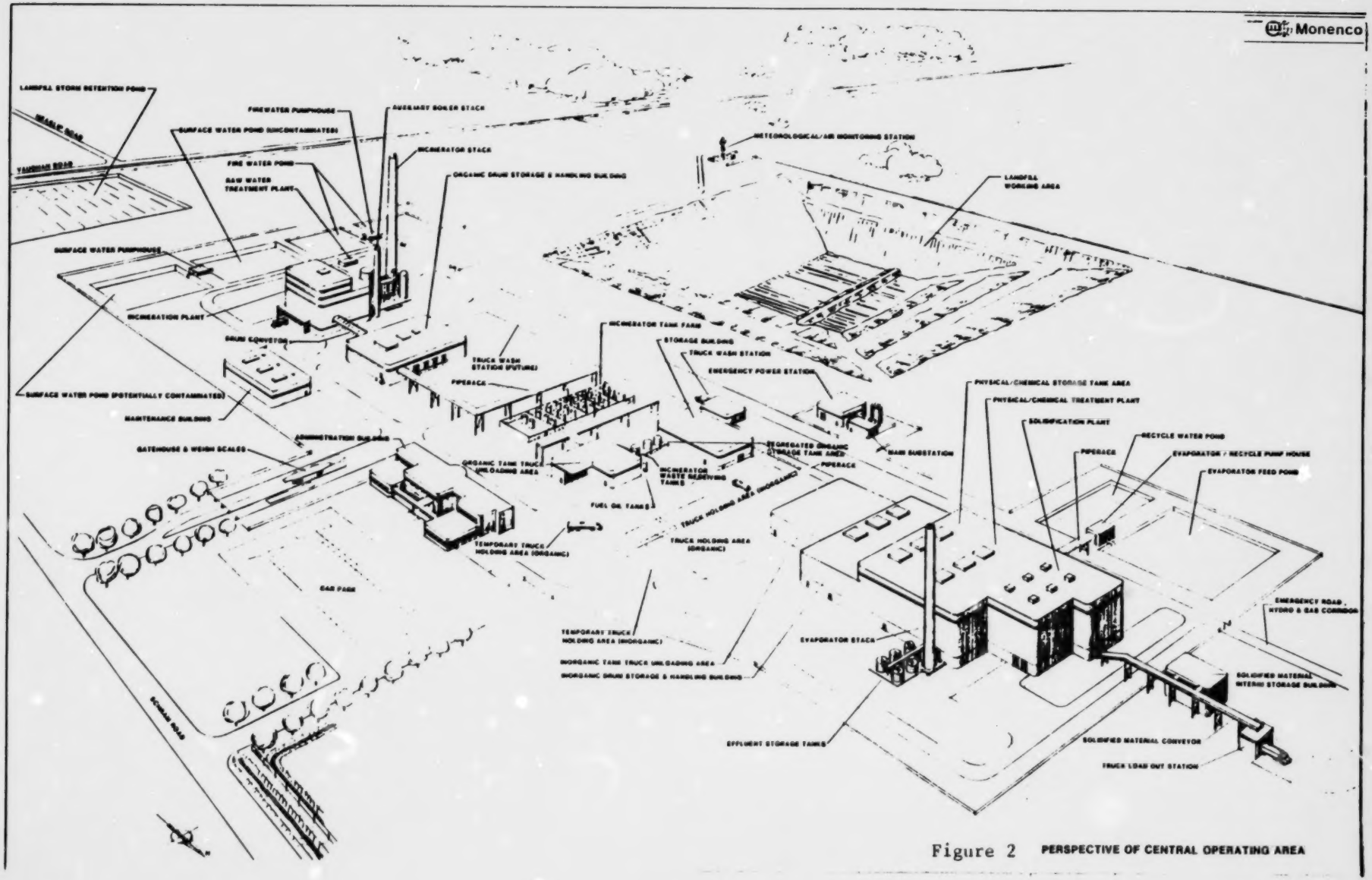

Figure 2 PERSPECTIVE OF CENTRAL OPERATING AREA

identified and measured. Some of the components of the environment that are being monitored are: air, soils and water (surface and ground) quality, flora and fauna, crops and livestock, traffic, noise, socio-economy of local communities, etc.

2.0 OWMC OBJECTIVES AND POLICIES

Throughout the site selection and facility design phases, OWMC has maintained the following goals:

- to minimize risks to human health;
- to minimize risks to the environment;
- to minimize the costs to OWMC and the people of Ontario.

The general Operating Policy of OWMC is to: receive, test, handle, treat and dispose of all liquid industrial and hazardous wastes safely without creating unacceptable risks to human health, safety or the environment. To this end, the Corporation will:

Application	Interpretational Guidelines
Laws and Regulations	o establish and maintain programmes to ensure that applicable laws and regulations are known and obeyed by its employees and contract forces

	o adopt its own standards when laws and regulations do not exist or may not be adequately protective
Occupational and Public Health	o ensure that OWMC operations do not create significant risks to the health of its employees, agents, customers and the general public
	o conduct accident prevention, occupational health and safety, and pollution control programmes to safeguard its employees and the public from injuries or health hazards
Application	**Interpretational Guidelines**
Environment	o adopt every reasonable measure to prevent or minimize impacts to air, surface water, ground water, soils, plants/crops and wildlife/livestock
	o monitor the environment (through selected biophysical parameters) for any changes as a result of its waste treatment activities
Operations Control	o set internal standards for minimizing risks from the facility's operations
	o inform, educate train and supervise employees in the use of proper procedures to minimize occupational hazards
	o cease the operation or utilization of hazardous materials if the health, safety or environmental risks are unacceptable

Co-operation	o work with government agencies, local community and others in analyzing emergency and environmental/health issues o participate in public education programmes concerning hazardous waste treatment and disposal o conduct and support research about the potential health and environmental effects of its activities, and share promptly any significant finding with others, such as employees, customers, government agencies and the scientific community.

3.0 ANTICIPATED WASTES

Treatment technology and process selection as well as the capacity of the proposed facility have been guided by surveys of waste generation in the Province of Ontario. Wastes expected to be received at the proposed treatment facility will be in the form of liquids, sludges, and solids and be both organic and/or inorganic in nature. The ultimate capacity of the proposed facility is a throughput of 300,000 tonnes per annum of waste. This capacity is expected to be reached in year ten of the operational life of the facility. Of the wastes received, 60,000 t/a will be organic and 240,000 t/a inorganic. It is estimated that in year five of the operation, the facility will achieve a throughput of one-half of its ultimate capacity, 150,000 t/a.

Operating at full capacity, the facility will receive waste delivered by approximately 80 trucks a day, five days a week. In addition, additives and reagents used in the various treatment processes, will be delivered to the facility by about ten trucks a day, five days a week. The preferred access route from the QEW to the proposed OWMC facility is approximately 22 km along Regional Road #24 and Highway 20.

Under normal circumstances* the waste generator will provide OWMC with a representative sample for analysis. This analysis will be in sufficient detail to determine the degree of hazard, the type of treatment(s) that is most appropriate for detoxifying and disposing of the waste and the treatment cost. In addition to an identification number being assigned the waste, the analysis will determine methods for a quick-test, often referred to as "fingerprinting" that will be subsequently used for rapid identification of the waste when it is delivered in bulk.

* Abnormal circumstances: i.e. contaminated material as a result of a spill.

Once this procedure has been completed satisfactorily, OWMC will schedule the shipment of the waste from the generator to the treatment facility. Upon arrival at the facility entrance and weigh scale, the waste shipment will be weighed and sampled. A fingerprint check will be conducted on this sample, thereby verifying that the waste is the same as the initial sample (upon which, the type of treatment(s) will have been been predetermined). When this is complete, the truck will be routed to the appropriate unloading location (bulk liquids, bulk solids and drums). The need for truck washing following unloading will also be determined. Documentation/instruction will direct the truck driver and ensure that the waste is unloaded at the correct location.

The following sections describe the major procedures and processes involved in waste treatment at the proposed facility.

Figure 2 illustrates the general layout of the facility.

Township of West Lincoln, Regional Municipality of Niagara, Local Detail

OWMC Ontario Waste Management Corporation

PROPOSED SITE

Figure 2

4.0 MAJOR PROCESS AREAS

The following describes the major procedures or processes and some of the associated safety features that are/will be incorporated into the design and operations of the proposed Facility.

4.1 Drum Unloading

Different unloading procedures apply to the unloading of drums, bulk solids, bulk liquids and sludges.

Trucks carrying drums will be inspected to confirm the number of drums and the accompanying documentation/waste indentification number. The shipment will then be directed to either the organic or the inorganic drum handling facility as appropriate. OWMC personnel will unload the drums using forklift trucks. During this process all drums will be inspected and re-packed if necessary. Each consignment of drums will be placed in a designated area.

Once the contents of the drum have been confirmed by the laboratory, it will be identified by an acceptance label bearing the waste identification number and moved to an area designated

for storage of accepted waste. Each drum will be weighed prior to the waste being processed.

The handling of drums containing organic wastes will depend on the physical properties of the waste. Drums containing liquid will be sent to the drum pump-out station where the contents will be pumped to the designated tank in the organic tank farm. Drums containing heavy sludges will be opened and sent to the drum crusher where they will be crushed while discharging their contents into a sludge hopper. Drums containing solids or non-pumpable sludges will be sent to the drum opening station where a portion of the contents of each drum will be transferred to an empty drum.

Drums containing inorganic liquid and pumpable sludge wastes will be tipped into receiving tanks and the drums washed. Waste and wash water will be pumped to a designated tank storage area. Dry inorganic solids in drums will be slurried and then treated in the physical/ chemical plant or sent directly to solidification if meeting the requirements. Empty drums will be washed and recycled or crushed and incinerated.

4.2 Bulk Solids Unloading

Vehicles containing dry organic bulk solids will, after acceptance, proceed to the incinerator building for unloading. Correspondingly, vehicles containing inorganic bulk solids will go to the solidification plant, and depending upon the type of material, the waste will be tipped into the appropriate receiving pit.

4.3 Liquid and Pumpable Sludge Unloading

Vehicles containing liquids or pumpable sludges will be directed to one of the unloading bays. Organic pumpable wastes will be transferred to a designated storage tank in the incinerator tank farm. Whereas, inorganic pumpable wastes will be transferred to a designated storage tank in the physical/chemical tank storage area. These transfers will be performed by an OWMC employee. If residues remain in the tanker-truck following unloading, they will be flushed out with water that will go to the same storage tank as the waste. When the unloading and any necessary clean-up are completed, to the satisfaction of OWMC, the truck will either leave the facility directly or will do so following truck washing.

4.4.1 Organic Tank Farm Storage

Organic liquid wastes will be stored in the organic storage tank farm, containing 25 storage tanks, each with a capacity of 120 m^3, four each with 40 m^3 capacity and four each with 10 m^3 capacity.

4.4.2 Organic Tank Farm Safety Features

All tanks will be made of carbon steel, suitably designed and equipped with the necessary safety features for the handling and storage of flammable materials, including an inert gas (nitrogen) blanketing system. Vapours will be directed to the incinerator, or when the incinerator is not working, passed through an adsorption system prior to release. Each tank will have level alarms and controls to prevent overfilling. The tanks will be dyked so as to contain the capacity of the largest tank plus 10% of the sum of all other tanks within the dyked area, according to the applicable codes and guidelines.

A record of the contents will be kept at all times. In the event of an emergency in this area, all materials will be treated as flammable.

Dyked area drains will normally be closed and will be drained to the potentially contaminated drainage system on a controlled basis.

4.5.1 Physical/Chemical Tank Storage

The inorganic waste storage tanks will be located inside the physical/chemical treatment plant as shown in Figure 2. In the physical/chemical tank storage area, the following waste groups will be accommodated, neutral/alkaline wastes, and aqueous organic wastes.

4.5.2 Physical/Chemical Tank Storage Safety Features

The tanks will be grouped and dyked according to the wastes they may contain. Each tank will be fitted with level alarms and switches to prevent overfilling.

Inorganic wastes are not considered flammable, but will be treated as hazardous. The aqueous organic wastes which are considered flammable will be stored in a segregated area of the Physical/ Chemical Tank Storage building. The inorganic tanks will vent through a scrubber/adsorption system, while the aqueous organic tanks will vent to the incinerator, or through an adsorption system when the incinerator is not operating. Tanks with compatible contents will be dyked together and each dyked area will contain 110% of the maximum capacity of the largest tank except for aqueous organics, where it will be 150%. Drains from the dyked areas will be maintained closed and drained to the potentially contaminated drainage system, in a controlled manner.

The physical/chemical tank storage farm is to receive wastes from the unloading station and from the drum-handling facility and stores these prior to processing in the physical/chemical facility.

4.6 Waste Blending

Proper blending of wastes is important to the efficient operation of a waste treatment facility. Physical and chemical interactions will provide the basis for the blending procedure for the wide variety of waste which will be delivered, to the OWMC Facility.

Organic wastes will be blended to control, optimize the heat value of the waste and to adjust the concentration of contaminants and optimize the flue gas treatment process.

4.7.1 Incineration

The Incineration Plant will have an initial capacity of 30,000 t/a of liquid and solid organic wastes. The feed to this unit will include:

- pumpable organic liquids and sludges from the organic tank farm;

- vapours from the organic tank vent system;
- auxiliary fuel
- solid wastes from the waste pits.

The major items of equipment in this plant will be:

- solid feed waste pits and crane system;
- rotary kiln incinerator;
- secondary combustion chamber;
- waste heat boiler;
- spray dryer;
- electrostatic precipitator;
- induced draft fan;
- wet scrubbing system;
- stack;
- slag, ash and salt ash handling system;
- auxiliary boilers and associated equipment;
- solidification system for salt and ash.

Liquid and solid wastes will be fed to the rotary kiln incinerator which is a large refractory-lined steel drum 4 m in diameter and 11 m in length. As the waste moves down the drum, it will be incinerated at temperatures between 1000 and 1400°C.

Slag will run from the discharge end of the rotary kiln into the quench system and will be discharged into bins. The combustion gases will enter the secondary combustion chamber where combustion is completed with the addition of secondary air. Prior to entering the waste heat boiler, tertiary air is added to control the gases. The waste heat boiler cools the gas from about 750°C to 325°C and generates steam. The cooled flue gas will enter the spray dryer, where it is used to evaporate the recycled scrubber water. An electrostatic precipitator follows the spray dryer, for the removal of particulates from the flue gas prior to entering a three-stage scrubbing system, from where the gases exit to the atmosphere via the stack.

The incineration process will be controlled from a central location. In the event of an emergency or failure of critical equipment, an automatic shutdown sequence will be activated, which will safely shutdown the process.

Stack emissions will be monitored. In the event that the monitors show a decline in the performance of the incinerator or the gas cleaning system, appropriate corrective action will be taken and, if necessary, feed to the unit will be discontinued until such time as the cause of the faulty performance is identified and corrected.

To avoid the possibility of explosions in the incinerator or the boilers, safety devices will be installed to prevent the entry of fuel for start-up until the correct purging procedures have taken place.

The primary objective of the incineration plant will be to destroy organics and treat the products of combustion. This is reflected in the following description of some of the safety features that will be included in the design/operation of the plant.

4.7.2 Incineration Plant Safety Features

o Automatic Cut-Off of Waste Feed

Waste being fed to the incinerator will be automatically cut-off, should any of the following events occur:

- high carbon monoxide or total hydrocarbon content in the treated flue gas;
- low temperature in the secondary combustion chamber;
- low primary and/or secondary air flow;
- sustained abnormal pressure in the secondary combustion chamber;
- high steam pressure in the the boiler drum;
- low water level in the waste heat recovery boiler;

- malfunction of the induced draft fan;
- power failure;
- failure of two precipitator fields (electrostatic precipitator);
- high temperature in the secondary combustion chamber;
- failure of two out of three thermocouples located after secondary air injection in the secondary combustion chamber.

Other features related to the efficient and effective operation of the incineration plant include:

o Waste Feed Interruption

An unexpected interruption of waste feed will be detected by a loss of temperature in the secondary combustion chamber, an unexpected operation of the auxiliary fuel burner in the sidewall of the secondary combustion chamber and a significant increase in the oxygen concentration level in the flue gas. In this situation, there is no risk of imminent harm to human health or the environment and no special or unusual action is required. The burners in the front wall of the kiln and secondary combustion chamber will be utilized, as required, to maintain required temperature while the situation is rectified.

- Loss of Auxiliary Fuel (Natural Gas)

An interruption in the natural gas supply to the burners in the front wall of the kiln and in the secondary combustion chamber will be detected by a loss of pressure in the fuel line. Should this situation occur during start-up or shutdown procedures, there will be no risk of imminent harm to human health or the environment and no special action will be required, as wastes will not have been introduced to the system (start-up) or the destruction of waste will have been completed (shutdown). Should this situation occur during normal operation of the incineration system when operation of the burners is required to maintain temperature in the secondary combustion chamber, then all waste feed will be suspended until normal operating conditions can again be established and maintained.

- Combustion Temperature Limits

Temperatures in the combustion system will be measured by temperature sensors located in the secondary combustion chamber. Organic waste cannot be introduced to the incinerator unless the flue gas temperature before secondary air addition is above 1,050°C, aqueous waste cannot be introduced unless the temperature is above 1,100°C, and

segregated organic wastes such as PCBs cannot be introduced unless the gas temperature prior to secondary air addition is above 1, 250°C. Control interlocks will prevent waste being introduced unless these temperature conditions are satisfied.

Conversely, the feeding or organic wastes, such as PCBs, will be automatically shut-off should the flue gas temperature prior to secondary air addition fall below 1,200°C; aqueous waste feed will be shut-off should the flue gas temperature before secondary air addition fall below 1,105°C; and organic waste fed will be shut-off if this temperature falls below 1,000°C.

It should be noted these are safety interlocks and the normal operating temperatures prior to and after secondary air addition will be approximately 1,200°C and 950°C, respectively. The operator will have ample warning and time for corrective measures should these temperatures start to fall, and thereby avoid the initiation of safety interlock features.

Nevertheless, should flue gas temperature before secondary air injection drop below 1, 050°C, all aqueous waste feed will be stopped automatically to prevent a further decrease.

Should the temperature continue to drop, the auxiliary fuel burner in the secondary combustion chamber will start up automatically when the temperature reaches 1,030°C. If this does not remedy the situation, all waste feed will automatically be cut-off when the temperature drops below 1,000°C.

Segregated organic wastes such as PCB are fed into the kiln by a dedicated burner. This can only be done when the kiln front wall burner is operating, thereby providing additional assurance that high destruction efficiencies will be achieved and discharges to the environment minimized.

o Abnormal Level of Excess Air in the Combustion System

The level of excess air in the combustion zone will be monitored by measuring the concentration of oxygen in the flue gas. Moderate fluctuations in the oxygen level are normal, however, a significant, sustained deviation from the established level indicates a malfunction.

Heat input by the organic liquid lance will be controlled by the oxygen level in the flue gas in normal operation. However, if the oxygen content drops below or rises above a predetermined acceptable operating range then control of heat

input by this lance is automatically switched to temperature control based on temperature in the secondary combustion chamber.

A drop in the concentration of oxygen in the flue gas indicates excessive waste feed (heat release) or a malfunction of the primary or secondary combustion air systems. In either case, a decline in the concentration of oxygen will result in an increase in the temperature in the secondary combustion chamber.

The control system will respond automatically to falling oxygen concentration or increasing temperature by first reducing the high heating value liquid waste feed rate. On a continued decline in oxygen concentration or a continued increase in temperature, or in the event of detection of a malfunction of either the primary or secondary combustion air systems, an alarm will sound followed by suspension of all waste feed to the system.

Conversely, an increase in the concentration of oxygen in the flue gas indicates inadequate waste feed (heat release) or an increase in the amount of combustion air. In either case, an increase in the concentration of oxygen will result in a decline in the temperature in the secondary combustion chamber.

The control system will respond automatically to increasing oxygen or decreasing temperature by first increasing the high heating value liquid waste feed rate. On a continued decrease in temperature, an alarm will sound followed by automatic ignition of one of the auxiliary fuel burners in the secondary combustion chamber. Further decline in temperature, or in the event of an excess amount of combustion air or if a burner flame-out condition is detected, will result in a second alarm being sounded followed by suspension of all waste feed to the system.

- Abnormal Pressure in the Secondary Combustion Chamber

A sustained positive pressure in the secondary combustion chamber is indicative of excessive waste feed, malfunction of the induced draft fan or a blockage somewhere in the path of the flue gas as it flows through the system. In any case, waste feed is suspended if the positive pressure continues for more than a few seconds.

- Malfunction of the Primary or Secondary Combustion Air Fans

A malfunction of the primary or secondary air fans will be detected by measuring air flow at the fan discharge. Loss

of air flow from either the primary or secondary combustion air fans will result in immediate suspension of all waste feed and initiation of a controlled shutdown of the system. The burner in one of the secondary combustion chamber's sidewalls will be utilized, as required, to maintain temperatures in the combustion zone until destruction of the waste is complete.

- Water Level in the Boiler Too Low

The water level in the waste heat recovery boiler will be monitored by observing the level of water in the steam drum. In normal operation the water level in the steam dryer is controlled automatically by a three element feed water controller. Low water level is indicative of a malfunction of the boiler feed water system or a major leak in the boiler. In either case, immediate suspension of waste feed will occur and a controlled shutdown of the system initiated.

- Temperature in the Spray Dryer Too High

The flue gas temperature in the spray dryer will be monitored by temperature sensors located at the entrance and exit of

the dryer. High entrance temperature is indicative of a malfunction of the flue gas cooling system or heavy fouling of boiler, whereas high exit temperature from the spray dryer may indicate a malfunction in the spray dryer feed system. Higher temperature of the flue gas leaving the spray dryer will automatically initiate operation of the emergency water system and an alarm. If the condition persists, all waste feed will be suspended and a controlled shutdown initiated by operations staff. Low entrance temperature may cause operational difficulties since the flue gas may not have sufficient heat to evaporate the required quantity of scrubber effluent. However, this condition can only occur during start-up and shutdown of the Incineration Plant. Operations staff will be trained when and how to start introduction of neutralized scrubber blowdown or water to the spray dryer. Additionally, the operating manual will detail the necessary steps and conditions.

o Loss of Power to the Electrostatic Precipitator

The electrostatic precipitator will have three electrical fields. Power to the fields will be monitored with

voltmeters on the electrical feed, and a loss of power to two fields will result in an immediate suspension of waste feed and a controlled shutdown of the system.

- Malfunction of the Induced Draft Fan

A malfunction of the induced draft fan will be detected by an increase of pressure in the secondary combustion chamber, an unexpected reduction in fan speed or an unexpected loss of electrical power to the induced draft fan motor. A malfunction of the induced draft fan will result in immediate suspension of all waste feed. The primary and secondary combustion air fans will also be shutdown.

It should be noted that the induced draft fan has an auxiliary motor drive which continues to operate the fan during power interruption, as further described under "Power Failure".

- Interruption of Quench or Scrubber Water Circulation

A loss of quench or scrubber water circulation will be detected by a variety of indicators including loss of water

pressure, loss of scrubber liquor flow, loss of electrical power to one or more of the circulation pumps as detected by auxiliary contacts on the pump motor starters, high temperature of the flue gas leaving the quench section or loss of fluid level in the scrubber liquor sumps. All quench and scrubber circulation pumps will be spared and failure of the operating pump will initiate the automatic starting of its spare, except in the instance of a general power failure which will cause all waste feed to be stopped and a system shutdown initiated. High temperature of the flue gas leaving the quench section will automatically initiate operation of the emergency water system and an alarm.

o Power Failure

The potential for emission of contaminants to the environment during a power failure will be mitigated by the following design features and operational sequences.

- Plant control and status monitoring systems are connected to an uninterruptible power supply (battery system) so that such systems remain in operation throughout a power failure event.

- When burning non-liquid waste contaminated with PCBs, the secondary combustion chamber burner used to maintain temperature in the secondary combustion chamber will be placed in operation. The normal power supply to those items necessary to keep the burner in operation will be supplemented by an alternate supply arranged to ensure that the burner will remain operational during a power failure. The burner will automatically modulate to the high-fire position, upon power failure, thereby providing additional assurance that organics volatilized in the rotary kiln, will continue to be destroyed.

- Waste feed to the incineration system is automatically terminated upon power failure.

- The emergency electrical power system will be initiated and electrical power will be provided to critical items of equipment within 30 seconds.

During the intervening period:

- The induced draft fan will gradually slow down but continue to draw flue gas through the system, preventing the egress of gases through kiln seals, feed chute,

boiler seals and other potential sources at the working level;

- Temperatures in the combustion system begin to fall, but remain at values which will destroy residual organic contaminants in the system;

- Visible combustion (flame) in the kiln is substantially reduced, although the residual heat, together with air drawn into the system by the induced draft fan, will be sufficient to complete combustion of any material in the kiln, over an extended period;

- The waste heat recovery boiler continues to cool flue gases, and thereby generate steam, and boiler feed water supply is not interrupted since the steam turbine-driven feed pumps continue to operate;

- The flue gas temperature from the boiler drops immediately due to the reduced flue gas flow;

- Flue gases passing through the spray dryer and electrostatic precipitator at higher than normal temperatures will not cause any harm, since both units

will be designed to withstand temperatures of up to 425°C;

- Quench water continues to be provided to the first stage of the wet scrubber from head tanks, located in the stack, which are sized to provide up to 15 minutes of water supply;

- Flue gases continue to be partially treated in the wet scrubber by the removal of acid gases and particulates in the quench section and also the residual water in the packed tower, albeit at a reduced efficiency; and

- Flue gases continue to be discharged to atmosphere via the stack at reduced volumes.

When the emergency power system is operational, within 30 seconds of power failure, the following equipment will be restarted automatically:

- Induced draft fan auxiliary drive will be started to continue operation of the fan, at reduced speed, to maintain the flow of residual flue gases and prevent egress of gases to atmosphere in the operating areas;

- Wet scrubber circulating water pumps will restart, thereby reinstating the scrubber at full operational efficiency;

- Rotary kiln drive motor;

- Equipment cooling systems;

- Electrically-driven boiler feed pump and associated feedwater transfer and condensate pumps;

- Required auxiliary systems.

The incinerator can continue to be shutdown under controlled conditions or it can be restarted in an orderly manner once normal power has been restored to the plant.

4.8 Ventilation

The following features are included to mitigate risk to human health and discharges to the environment.

- Waste storage tanks and blending tanks are connected to an inert (nitrogen) blanket system and vents from this

system are discharged to the incinerator or to atmosphere via a scrubbing system when the incinerator is not operating.

- The waste storage pit area will be ventilated to the incinerator by the primary air fan or to atmosphere using roof-mounted ventilation fans when the incinerator is not operating.

- The kiln-front area including drum conveyor area will be well ventilated to prevent the build up of harmful or dangerous concentrations of organics. Drums will be covered either with a loosely-placed top or a plastic cover.

- The control room will be ventilated and air conditioned.

- The rotary kiln including end-seals will be located in an isolated room with controlled access for personnel protection. The room will be vented to atmosphere via roof vents.

- The incinerator building enclosing the secondary combustion chamber, waste heat recovery boiler and auxiliary equipment will be ventilated in accordance with normal industry practice. No special contaminant control measures are required in this area.

- All other buildings are ventilated in accordance with normal industry practice, there being no special contaminant control requirements.

4.9.1 Physical/Chemical Treatment

The physical/chemical treatment plant will be designed to treat 120,000 tonnes per year of incoming inorganic wastes. There will be three distinct treatment systems which are:

- o inorganic waste treatment;
- o aqueous organic waste treatment;
- o miscellaneous waste treatment.

Each treatment system will contain the following fundamental stages:

- o primary treatment;
- o secondary treatment;

- o intermediate storage;
- o effluent polishing;
- o final effluent storage
- o evaporation

The components of each treatment system are as follows:

- o Inorganic Waste Treatment

  This will be a batch treatment system and includes the following primary and secondary treatment operations.

  - Primary Treatment

    - phase separation;
    - dissolution/slurrying;
    - blending;.

  - Secondary Treatment

    - oxidation/reduction;
    - neutralization/precipitation;
    - coagulation/sedimentation;
    - sludge thickening/dewatering;

  Polishing steps include:

- granular media filtration;
- activated carbon adsorption;
- reverse osmosis;

The primary and secondary treatments are carried out in batches at low temperature and atmospheric pressure (except for the filtration system). Materials handled are not flammable, but the system does involve the use of and processing of acids, alkalis, and chemicals that could produce toxic gases.

Since toxic gases could be generated, such as hydrogen sulphide and hydrogen cyanide, monitoring sensors will be installed to detect them. The chemical reactions are to take place in closed tanks with the off-gases passing through a purification system. A high ventilation will be maintained to prevent the accumulation of any toxic gases in the plant atmosphere.

o Aqueous/Organic Mixture Treatment

This process is also a batch treatment system and will handle mixtures of organics and water. The organics will be separated in the following primary and secondary treatment systems:

- Primary Treatment

  - phase separation;
  - blending.

- Secondary Treatment

  - emulsion breaking;
  - centrifugal separation;
  - dissolved air flotation.

Following this, the effluents can be polished in an activated carbon adsorption system. The concentrated organics will be sent to the incinerator for destruction.

Due to the fact that these wastes contain organics, then certain components may be flammable. All reactions involving potentially flammable materials will be carried out in a segregated section of the plant with the appropriate electrical classification required for handling flammable materials. This area is also equipped with a foam system.

o Miscellaneous Waste Treatment

This treatment system will handle miscellaneous wastes, such as landfill leachate, and contaminated drainage from the facilities drainage systems. The processes will include the following primary/secondary treatment:

- equalization;
- neutralization/precipitation;
- sludge thickening/dewatering.

Polishing process will include:

- granular media filtration;
- activated carbon adsorption;
- reverse osmosis;
- final storage.

The materials processed in this system will be aqueous, very dilute, and not flammable.

In the physical/chemical treatment plant there will be control room and laboratory. However, much of the operation will be carried out within the plant itself and the operators will generally be working in the main part of the building.

This plant will be designed so that any spills will be retained in the collection system and will be retreated in the process. The possibility of spills occurring will be minimized by the installation of high-level alarms and controls on all tanks and vessels, so that liquid transfers are automatically stopped prior to overfilling any vessel.

The only items of equipment operating at elevated pressure are the filters and the polishing systems. All equipment will operate at ambient temperatures with the exception of the evaporator.

Treated effluent from the physical/chemical plant will be used to supply service water throughout the Facility, with any excess evaporated.

In the initial years of operation, the physical/chemical plant will operate normally on the day shift only, five days a week, approximately eight people will be working in the building while the plant is operating.

4.9.2 Physical/Chemical Plant Safety Features

In the treatment of inorganic wastes, OWMC will be processing some materials that could emit toxic gases, if the wrong chemicals are added or if the reactions are not properly controlled.

The possibility of processing errors will be minimized by the application of appropriate controls, instrumentation and the use of qualified personnel. Safety features included in the desing/operation of the plant specifically to reduce the risk to plant personnel and the environment are as follows:

- All waste storage and treatment processes within the physical/chemical building will be carried out in vessels which are totally enclosed and vented. Vented air will be scrubbed before it is discharged.

- Process reagents will be stored individually in separate enclosed areas. In all cases, fugitive dusts, odours and fumes will be contained and scrubbed from the ventilation air before it is discharged from the physical/chemical building.

- The physical/chemical control room will be maintained at a slightly positive pressure with a separate clean air supply.

- Collection and scrubbing system will be on emergency power supply to maintain full ventilation capability during power outages.

4.10 Solidification

Residues from treatment processes will be solidified using reagents such as cement and sodium silicate. This will result in a chemically and physically stable mass which will be deposited in the engineered landfill. Materials which will be treated in this way include:

- solid and liquid residues from the Physical/Chemical Treatment Plant;

- inorganic wastes such as residues from the generators in-plant waste treatment system, which cannot be further improved by physical/chemical treatment;

- mixtures of salt ash and boiler ash from the incinerator.

Two solidification processes are to be used: one to treat low and the other to treat high solid content residues.

In the "low solid system", waste liquids will be combined with cement and sodium silicate in a mixing tank and pumped to the landfill.

In the "high solid system", filter cake from the physical/chemical plant and other stabilized solid wastes will be mixed with cement and water in the mixers to produce a concrete-like material. This material is then transported to the landfill site.

No flammable or highly toxic materials will be handled in the solidification plant.

In the initial years, the plant will operate eight hours a day, five days week and there will generally be three people working in this area.

4.11 Engineered Landfill

The material which has been solidified will be deposited in the engineered landfill. One of the driving forces for Site Selection was geology/hydrogeology. The preferred site in the Township of West Lincoln contains impermeable clay down to a depth of over 30 m. This type of substrate significantly reduces risks of ground water contamination from landfill leachate.

Landfill areas will be excavated to a depth of 15 m and a leachate collection system installed. Solidified waste residues will be deposited in this engineered landfill to a depth of 10 m and then backfilled with the excavated clay (approximately 5 m).

Monitoring wells will be placed around the landfill site in order to detect any contamination of ground water. The 50 m buffer zone between the outer edge of the landfill and the facility boundary will provide time and space for any remedial action that may be required.

Activities in the landfill area will be restricted to day shift only, five days a week.

4.12 Drainage Collection Systems

The central operating area (COA) of the facility will have three segregated drainage collection systems.

- uncontaminated drainage system: collecting roof drainage and runoff from areas where there is no risk of any contamination;

- potentially contaminated drainage system: collecting drainage from facility roads, unloading areas and some operating areas' drainage;

- contaminated system: collecting drainage from areas where wastes and chemicals are stored and/or treated.

5.0 GENERAL FACILITY SAFETY PROCEDURES

5.1 Waste Identification and Data Management

Pre-authorization testing of wastes before they are accepted for treatment by OWMC has been described in Section 3.0 - Anticipated Wastes. Waste identification numbers and appropriate labelling and record-keeping will be maintained in order to track any waste received by the facility. Computerized information retrieval will assist in this tracking process.

5.2 Fire Protection

The OWMC facility will have an extensive fire water system supplied by three pumps, two diesel-driven and one electric. Any two pumps will be able to supply sufficient water from either of the two firewater ponds (7,575 m^3/2 million U.S. gallons each). In addition, certain areas containing flammable materials will have a foam system.

Personnel trained in firefighting will be on-site at the facility at all times. This training will not only include the procedures to be taken in combatting the various types of fires that could occur at the facility, but also in the operation of the firefighting equipment that will be available on-site. In

addition, an emergency response team composed of OWMC shift staff will also be available in the event of a fire/emergency.

Certain areas of the facility will, because of their function, present greater fire risks than others and special safety systems will be installed. An example, is the bulk liquid waste storage tanks in the incineration area, much of which is flammable, hence the tanks will be protected by permanent water and foam monitors. All organic storage tanks will be equipped with nitrogen blanketing systems.

Further examples of fire/safety protection include:

- good ventilation;
- water deluge systems;
- flame and heat detectors;
- foam deluge system;
- firewater stand pipes and hose cabinets;
- automatic water sprinkler systems.

OWMC will maintain an on-site emergency vehicle which will be equipped with firefighting supplies.

5.3 Spill Protection

Engineered containment will be designed into the Facility, to minimize the opportunities for release of contaminants from the central operating area to either the groundwater or surface water systems. The criteria for the design of the containment systems in the Facility include:

- engineered features wherever practical, to minimize the opportunity for contaminant pathways from the central operating area to the ground water system;

- features such that reliance shall not be placed on the natural containment features of the site;

- components of the Facility employed to store pumpable liquid wastes must have two levels of engineered containment.

During unloading, trucks will be parked in an unloading bay that will be curbed. This curbed area will freely drain into a tank located in a concrete-lined pit.

The organic and inorganic tank truck unloading areas will have a double engineering containment system. This is achieved by steel or fibre reinforced plastic unloading tanks for organic and

inorganic waste, respectively, located in separate concrete pits for each below-grade waste unloading tank.

This arrangement provides secondary containment and also permits access around the waste unloading tanks for inspection and repair. In addition, each concrete pit will drain to its own sump which will be equipped with level alarms for detecting any spills or leaks. The sump will be pumped out using a portable pump.

Below ground concrete pits located at the incineration plant and solidification plant, for receiving and storing dry organic and inorganic waste respectively, will have steel liners. The steel liners provide assurance against the possibility of high ground water leaking into these pits.

All outside storage tank areas will be surrounded by dykes, that will be able to contain the contents of more than the largest tank within a given dyked area. Any spill from the failure of a tank or pipe will be retained behind the dykes.

The first level of containment within the Central Operating Area is the storage, transfer and treatment equipment itself. The second level of containment is provided by:

- concrete or tile floors, with curbs around process equipment areas;

- lined concrete floor drains discharging into drainage sumps;

- drainage sumps which comprise a separate sump tank located in a concrete pit to facilitate inspection;

- sump tanks which include duplex pumps, automatic controls and high/low alarms, collect leaks/spills and wash-water for discharge into drainage receiving tanks and subsequently treated as waste;

- drainage sumps which overflow, to the potentially contaminated drainage system.

5.4 Monitoring

Monitoring of treatment processes, the workplace, and the environment will be fundamental to OWMC's Impact Management System. This System will be designed to predict and identify adverse effects, identify the cause or source, and initiate remedial or mitigative measures and measure the effectiveness of such measures.

Monitoring programmes for both on-site and off-site are being developed. The subject of this report being the Facility, the following description addresses On-Site Monitoring.

o On-Site Monitoring

The on-site monitoring program is being developed as a comprehensive quality assurance program to control incoming special waste, treatment processes, residues, effluents and emissions.

OWMC's monitoring program will continue to evolve as a result of:

- detailed engineering design;
- results of the Phase 4B biophysical and socioeconomic field programs;
- discussions with the community of West Lincoln; and
- requirements of the Ministry of the Environment as a condition of approval for OWMC's proposed Treatment Facility.

On-site monitoring will ensure that OWMC's treatment objectives are being achieved in accordance with OWMC's goals to minimize risks to human health and environmental impacts as follows:

- Tracking the special wastes from the time a waste generator submits a sample for treatability testing, through its treatment process and ultimate disposal.

- Performance and process monitoring and sampling to confirm that the treatment processes are functioning correctly.

- Implementation of a detailed inspection plan to ensure the safety of the Facility at all times.

- Environmental monitoring and sampling to complement routine monitoring for process control and to:

    - ensure the safety of plant personnel, the general public and the environment; and
    - ensure compliance with government standards and regulations.

o <u>Tracking Special Wastes</u>

Tracking special wastes will be achieved using the data management system and involves the following steps:

- sample received from the waste generator for treatability testing;
- treatment processes determined and delivery of special waste scheduled, if the generator elects to use OWMC's Facility;
- waste delivery received at gatehouse, documentation verified and load weighed in;
- waste "fingerprint" tested and unloaded;
- waste transferred to storage;
- waste transferred to its specified treatment process;
- residues from treatment processes disposed of in engineered landfill; and
- effluents from treatment processes disposed of by evaporation as required.

o Performance and Process Monitoring and Sampling

Monitoring and sampling will be conducted at all the process areas as follows:

Incineration Plant. Sampling of blended wastes will be conducted in order to verify that important parameters such as heating value, chlorine and sulphur content are within prescribed limits.

The concentration of the following stack gas contaminants will be monitored, to ensure optimum operation of the incineration system:

- carbon monoxide (CO);
- sulphur dioxide (SO_2);
- nitrogen oxides (NO_X);
- hydrogen chloride (HCl); and
- total hydrocarbons (THC).

In addition, periodic stack sampling will be conducted for selected contaminants which cannot be continuously monitored e.g. heavy metals.

Samples of boiler ash and salt (residue) will be taken periodically for analysis and solidification treatability tests to ensure that the optimum formulation is being used. The relative uniformity of the residue stream will permit batches of these materials to be solidified as they are received from the incineration process without the need to do treatability tests on each sample.

Samples of slag will be taken for analysis to confirm its suitability for disposal directly in the engineered landfill.

Continuous and intermittent analysis of samples from various locations in the steam, feedwater and condensate systems (associated with the waste heat recovery boiler of the flue gas cooling system), are to be conducted to ensure the efficient operation of the waste heat recovery boiler.

Physical/Chemical Treatment Plant. Sample analysis and treatability test information will be used to establish "treatment recipes" for wastes prior to physical/chemical treatment.

Quality control checks are to be carried out during the treatment sequence to ensure that treatment is proceeding as planned.

Samples of filtrate in the intermediate storage tanks will be taken to confirm that secondary treatment has produced a filtrate of acceptable quality prior to effluent polishing.

Samples of final polished effluent in the final effluent storage tanks will be taken and tested for quality prior to recycling on-site or discharging by evaporation.

Solidification Plant sample analyses and treatability testing will be carried out to establish treatment recipes for residues prior to solidification.

Quality control/checks are to be carried out in accordance with the established testing protocol for the Facility.

The quality of residues sent to solidification and of the solidified material disposed of in the engineered landfill will be monitored to ensure that they can be safely disposed of in the landfill.

Engineered Landfill leachate samples will be tested for quality to confirm the results of the treatability testing of the solidified material.

o Inspection Plan

In order to ensure the safety of the Facility at all times, detailed inspections will be made by a staff safety officer.

5.5 Employee Selection and Training

The staff operating the facility will be properly qualified and trained. Training will be an ongoing process, ensuring that operating skills will continue to be upgraded. Training in safety, firefighting, emergency response and first aid will be ongoing.

5.6 Occupational Health and Safety

Safety includes both the prevention of physical injury and also the prevention of accidental occurrences which can affect the health of employees, the community or the environment.

OWMC will establish a safety program in the facility which will address training, first aid, industrial hygiene, and all factors contributing to maintaining a safe working environment. A safety officer will be appointed before the plant commences operation, with the responsibility of designing safety programs and monitoring their effectiveness.

Safety committees will be formed and will include the Safety Officer, supervisors and plant operators. These committees will meet regularly and review safety practices in their respective facility areas, and recommend to Facility management improvements as required.

6.0 ON-SITE EMERGENCY RESPONSE PLAN (ERP)

6.1 Objective

The objective of the ERP is to provide a basic framework for planning and responding to an emergency at the OWMC Waste Treatment Facility. The plan provides a means for safeguarding the health and welfare of facility personnel and the neighbouring community and for protecting the environment.

6.2 Scope

The type of incidents addressed by the Plan are:

1. Spills;
2. Gas Releases;
3. Fire;
4. Explosion;
5. Special Emergency.

1. Spill

A spill can occur from improper handling of liquid chemicals on-site, from a tank rupture or other equipment failure. A

spilled material is categorized within the ERP as being corrosive, toxic, flammable, or possessing a combination of these properties.

2. Gas Release

Several types of gas release can occur at OWMC's Facility. Apart from normal gas release such as emissions from the incinerator scrubber stack, the multiple effect evaporator stack, and the auxiliary boiler, abnormal emissions due to operating upsets and accidents could occur. These include:

(1) fugitive emissions of volatile organics from improper waste handling, spills, and leaks;

(2) release from the mixing of incompatible wastes (e.g. hydrogen sulphide); and

(3) emissions generated from fires.

3. Fire

A fire could occur at various locations within the Facility. The most likely location would be where organic materials are

stored and handled, i.e. the tank farm, drum handling, and tank-truck unloading. An incident of this nature could release volatile organics to the atmosphere.

4. Explosion

An explosion could result from the mixing and ignition of incompatible wastes in the Facility. Although explosions are unlikely, they can occur in such locations as the incinerator, steam boilers as well as in the tank farm, where organic materials are stored.

5. Special Emergency

This category includes natural disasters such as wind storms, tornados, and earthquakes, in addition to bomb threats, sabotage, and forms of potential terrorist action.

7.0 ORGANIZATION AND RESPONSIBILITIES

The structure of OWMC's Emergency Response Organization is summarized in Figure 3. The function of each group in the organization is described below. The suggested nominees for the Emergency Response organization positions are outlined in Table 1.

FIGURE 3

Structure of OWMC's Emergency Response Organization

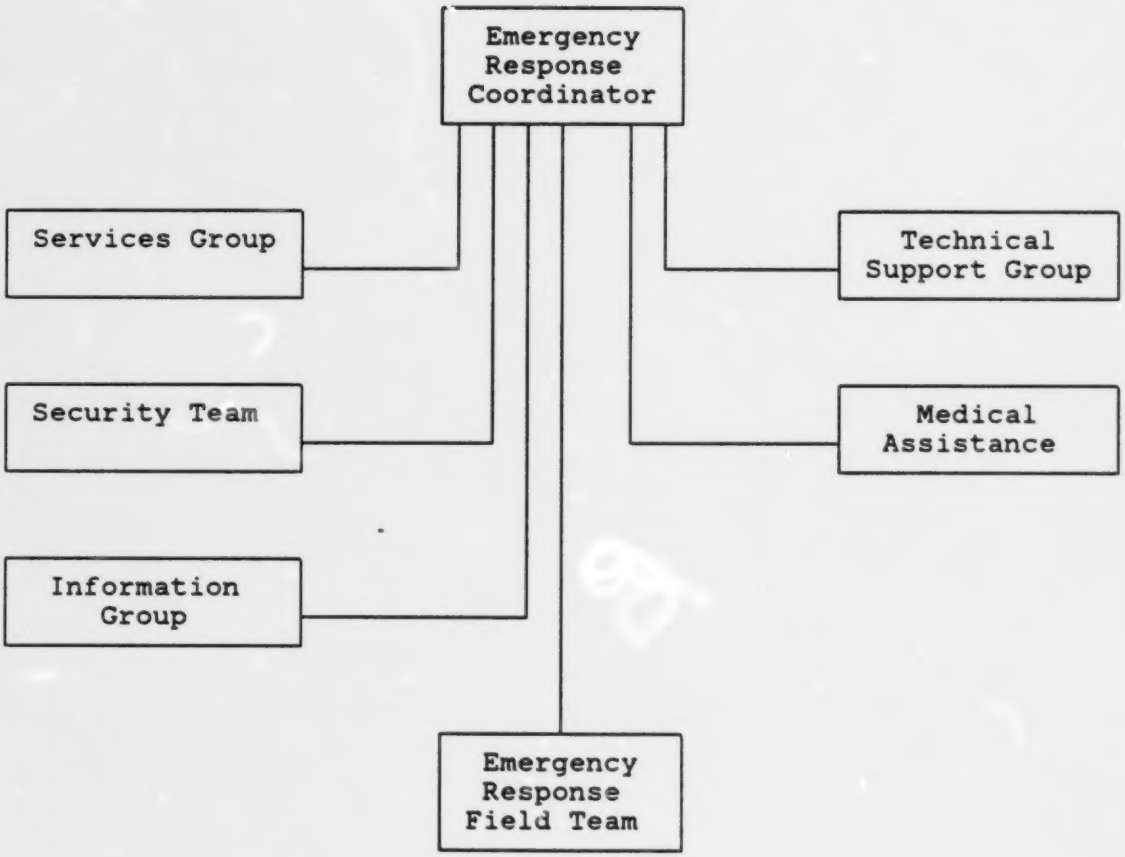

TABLE 1

Emergency Response Organization Nominees

EMERGENCY RESPONSE ORGANIZATION TITLE	EMERGENCY RESPONSE ORGANIZATION ALTERNATIVES	SUGGESTED DESIGNATE AND ALTERNATE (A List of Candidates Available to fill the Position)
Emergency Response Coordinator		This position could possibly be filled by the senior safety and fire engineer on staff.
Response Team Chief (on scene)	Three alternates	Four individuals will be selected and trained from the Facility foremen and operating staff.
Field Coordinator (safe area)		One of the Response Team Members.
Response Team Member	Team Member (number to be determined)	Trained group, selected from the Facility operators and trades-people
Security Coordinator		
Technical Coordinator		
Technical Support Group		Chemical engineers, analytical laboratory supervisor
Information Coordinator		
Services Coorindator	Three alternates	
Medical Assistance		Nurse from on-site during the day shift and on-call during off-shift hours.

- Emergency Response Organization

The Emergency Response Organization will be headed by the Emergency Response Coordinator who is in charge of all activity related to dealing with an on-site emergency. The Emergency Response Coordinator will issue directives and requests to the Emergency Response Field Team, the Security Team, the Technical Support Group, the Services Group, the Information Group, and to Medical Assistance. In addition, he will coordinate the activities of the organization involved in dealing with an emergency and keep all participants informed of status, progress, and plans for action. At times when it is impossible for the Emergency Response Coordinator to be present during an emergency, an Alternate Emergency Response Coordinator will perform his duties and responsibilities.

At the present time, the number of employees normally on-site during evening and night shifts has not been firmly established, but is expected to be approximately 30 people in total. In the event of a night (or weekend) emergency, all these people will, of necessity, be involved in responding to the emergency until additional help (OWMC personnel on-call) arrives in response to telephone or pager notification. The exception will be those people whose functions and

responsibilities for a certain facilities operations are vital and thus cannot be removed from their posts. The incineration plant is one of these areas.

The specific assignments of each of the shift people in the Emergency Response Field Team will be firmly established before the Facility begins receiving hazardous waste. As a minimum:

- one of the employees on-site must be the Emergency Response Coordinator or one of his alternates;

- one employee on-site must be one of the trained Emergency Response Field Team Chiefs; and

- two additional employees on-site must be trained members of the Emergency Response Field Team.

o Emergency Response Coordinator

The Emergency Response Coordinator (ERC), his alternate/ assistant, the Deputy Emergency Response Coordinator, will have the following responsibilities:

- development and maintenance of a workable ERP, establishment of the control centre, organizing and equipping the organization, and training personnel. This generally includes responsibility for maintaining a trained force with competent leadership on all shifts, providing adequate reserve manpower; ensure that the Fire and Safety Officer has maintained rescue and firefighting equipment in proper working order; and maintaining a good working relationship with off-site organizations;

- during an emergency, the ERC will be located at the main Command Post where she/he can coordinate activities among groups, furnish information to support field operations; and

- arranging for the Service Group to make special emergency equipment available.

- input to and contact with local and regional municipal government, senior government agencies, including as appropriate, the Ministry of the Environment, Ministry of Health, Ministry of Labour, and the Ministry of Transportation and Communications. She/he will also

provide communication with municipal and provincial emergency services such as the fire department and police.

- Emergency Response Field Team Chief

The Emergency Response Team Chief will perform the following duties:

- establishing a base as close to the emergency scene as safety permits;

- correcting the emergency situation as promptly as possible; and

- advising the Emergency Response Coordinator on the status of the emergency.

- Emergency Response Field Team

The Emergency Response Field Team, under the direction of the Emergency Response Team Chief will carry out firefighting, material release control activities, and rescue including first aid and implementation of life saving measures.

The Emergency Response Field Team will be responsible for the control of hazardous spills and the containment of contaminated runoff from firefighting operations. The Emergency Response Field Team evaluates the total hazard and requests the required resources from the Emergency Response Coordinator.

o Security Coordinator

Will be responsible for the following:

- coordinating the head count of employees, visitors, and truckers in the designated emergency and in the safe areas;

- advising the Emergency Response Coordinator if anyone is missing; and

- keeping record of personnel entering and leaving the Facility.

One of the operators of the affected area will carry out the head count in that area and will report results to the Security Coordinator.

During the day shift, the Receptionist in the administration building, and on night shift, the Gate Security Guard will be responsible for notifying the Security Coordinator the names of visitors inside the Facility. She/he will be responsible for ensuring that only vehicles and personnel dealing with the emergency are allowed within the Central Operating Area during the emergency.

For off-shifts and weekends, the Security Coordinator will delegate his responsibilities to the Gate Security Guard.

- Security Team

Security personnel under the direction of the Security Co-ordinator, will secure gates; control entry and exit of persons from the site; and contact local police if traffic control measures are considered necessary. Security will also receive visitors such as representatives of the media, and have them escorted to the proper locations; and control vehicular and pedestrian traffic.

- Technical Support Group

The Technical Support Group provides the technical input into the decision-making process. The Group provides a general

technical assessment of the developing situation. They also evaluate the safety and the risk status of various sectors of the site.

Monitoring of data to initiate steps to detect, assess, and handle chemical and biological hazards and the recommendation of measures necessary to decontaminate personnel and equipment will also be performed by the Technical Support Group.

This group will receive its direction form the Emergency Response Coordinator.

The Technical Support Group will evaluate the environmental impact on off-site receptors, and will report on the movement of airborne releases, possible surface and ground water contamination, and toxicity of material having the potential to move off-site.

o Information Coordinator

The Information Coordinator notifies the appropriate local, regional and provincial authorities, as to an emergency, provides input regarding public and media perspectives and

reactions for the decision-making process. He implements action requested by the Emergency Response Coordinator regarding communication with the public and media.

A public affairs representative will be designated to deal with the media for a major emergency. A press room will be established to provide quick, factual information to the media and public.

- Services Group

The Services Group will maintain continuity of water supplies and fire pump operations, continuity of electric power for vital services, and provide on-the-scene emergency lighting. They may utilize outside services.

The Services Group will coordinate and control all transportation needs. Requirements may include moving injured or disabled persons, transporting medical or emergency supplies, transporting first aid, rescue and firefighting personnel.

o Medical Assistance

The primary medical assistance will be provided by members of the Emergency Response Field Team who will be trained in first aid and life saving measures. Further medical assistance will be provided on the day shift by the Facility's nurse, who will treat injuries and arrange for the transportation of injured personnel to local hospitals. Day-time resources at the Facility can be made available during off-shift hours.

The nurse will ensure that hospitals have been alerted to handle emergency cases. In the absence of the nurse or doctor, the Emergency Response Coordinator or his assistant will arrange for ambulances and notification of local hospitals.

Medical assistance personnel are responsible for providing care for injured persons and those who may have had exposure to toxic agents at the site.

Medical and other appropriate plant personnel will meet with local medical officials and provide them with toxicological and medical treatment information pertaining to materials within the facility to which personnel could be exposed.

8.0 PROPOSED EMERGENCY RESPONSE CAPABILITIES

As construction of the Facility is completed and it enters its commissioning and start-up phase, the Emergency Response Organization will be required to be operational.

To ensure that the Emergency Response Plan evolves into the operational Emergency Response Plan, the following will be completed:

- finalization of Facility organization;
- assignment of responsibilities for emergency response functions to various staff;
- procurement of equipment and supplies;
- training of Facility Emergency Response personnel;
- arrangements with outside agencies for assistance; and
- liaison and assistance of local and regional fire and emergency response personnel with respect to joint training, and familiarization with equipment and Facility procedures.

9.0 RESPONSE PLAN DEVELOPMENT

Action to fulfill the first of these requirements will result from the organizational development of the Facility and OWMC.

Action to fulfill the other requirements is estimated to require a minimum of approximately two months lead time before the Facility begins to receive hazardous material (H-day), with progressive development as follows:

- o conversion of the Emergency Response Plan into a final operational Emergency Response Plan:
  - elapsed time 2 weeks, completed by H-day minus 8 weeks;
- o assignment of responsibilities for emergency response functions:
  - completed by H-day minus 6 weeks;
- o assignments with outside agencies for assistance:
  - completed by H-day minus 6 weeks;

- procurement of equipment and initial supplies:

  - completed by H-day minus 5 weeks;

- training of site Emergency Response participants:

  - elapsed time 4 to 2 weeks, coordinated and integrated with normal job training;
  - certain aspects such as first aid, firefighting and rescue procedures may require lead time for scheduling, and concentrated training;
  - completed by H-day;

- training of local and regional Response personnel:

  - elapsed time 4 weeks, largely but not completely integrated with site training;
  - completed by H-day.

For comfortable development and starting of the system, the preparatory parts of this action plan could begin six months before the date of initial receipt of hazardous materials, with personnel training held to a tight and later schedule in deference to the personnel costs involved.

10.0 EMERGENCY RESPONSE PLAN

This section is prepared as a complete action plan for distribution as a separate document to site management, the employees who are involved in the Emergency Response Organization, and agencies and contractors with whom emergency response arrangements have been made.

To show the operation of the plan, it has been written in the present tense. Details such as the names of workers, parts of the organization chart, and parts of the operating procedures for the site will not be available until the final design of the Facility. These must be added at a later date, when detailed information is available.

Since this is a generic action plan for emergency response, the specific liaison with outside services such as Municipal Fire Departments, Police, and government agencies such as the Ministries of the Environment and Labour are not identified at this time with specific city locations and office telephone numbers. These also must be added in the future.

Final revision should be completed before start-up begins, so that the plan is operational from the outset.

The Emergency Response Plan begins on the following page. Descriptions and explanations not normally included in Response Plans are presented to more adequately illustrate OWMC's intentions in this regard.

THE EMERGENCY RESPONSE PLAN
ONTARIO WASTE MANAGEMENT CORPORATION
OPERATIONS SITE

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1.0 EMERGENCY RESPONSE PLAN

1.1 Introduction

This Emergency Response Plan provides a framework of organization and instructions for activities in response to various emergencies. These activities include communications with the appropriate authorities and the neighbouring community. Since emergencies are infrequent and unusual events, the Plan deals also with preparation and training needs, and with special equipment and its upkeep. It outlines the investigation and follow-up procedures to be implemented after any emergency incident. It integrates communications and coordination of emergency effort with the appropriate civil authorities and the neighbouring community.

1.2 Policy and Objectives

It is a fundamental policy of the Ontario Waste Management Corporation to provide emergency response systems and facilities which can deal adequately with any on-site incident involving its operations, using on-site resources and appropriate assistance.

With this policy as its basis, the objectives of the Emergency Response Plan are:

- to minimize the risk to the lives and safety of on-site personnel and of the neighbouring community;

- to contain and minimize damage to the environment, to the surroundings, and to the site property, materials and equipment;

- to minimize loss of waste treatment capability by the resumption of safe operations as early as possible;

- to coordinate appropriate and effective action with outside agencies; and

- to maintain in existence an effective, trained organization capable of executing the established emergency response procedures at any time.

1.3 Scope

The Emergency Response Plan and Organization exist to permit the facility to respond effectively to any sudden abnormal situation where there is a danger to health, the environment, or property if prompt action is not taken.

An emergency is an event which contains simultaneously the five following conditions:

- o trigger - an incident or action which causes events beyond the normal scope of operations;

- o response - action is required to control the situation;

- o control - initially the situation requires the control of the company personnel immediately present and possibly additional resources;

- o threatening - the consequences of the event present negative implications to people, property, and the environment;

- o action - prompt activity must be initiated to minimize the consequences of the event.

1.4 Types of Emergency

Potential emergencies that could occur in the Facility are:

1. Spills of hazardous materials;

2. Gas Release;

3. Fire;

4. Explosion;

5. Special emergencies (including bomb threats, terrorist action, seismic activity, etc. Details given in Section 7.0).

The types of emergencies listed above are not mutually exclusive and two or more can be present in any single emergency event.

The requirements for responding to different types of emergencies can themselves be quite different. It is the intention that the following instructions provide a structured framework and organization for dealing with any emergency incident on-site, while providing within the same framework the scope for exercise of suitable management judgement and flexibility to deal with that emergency.

2.0 ORGANIZATION

2.1 Responsibilities

The operating responsibility for the emergency response system on the site, lies with the Emergency Response Coordinator. His

alternate and assistant for an emergency situation is the Deputy Emergency Response Coordinator.

The organization for emergency activities, and their response links, are shown in Figure I.

Linking directly to the Emergency Response Coordinator during an emergency event are the Emergency Response Team, a Security Team, a Technical Support Group, an Information Group, a Services Group, and Medical Assistance. The Services Group includes engineering and maintenance support functions.

The Emergency Response Coordinator provides management liaison to the executive of OWMC, and eventually to the authority residing in the Ministry of the Environment.

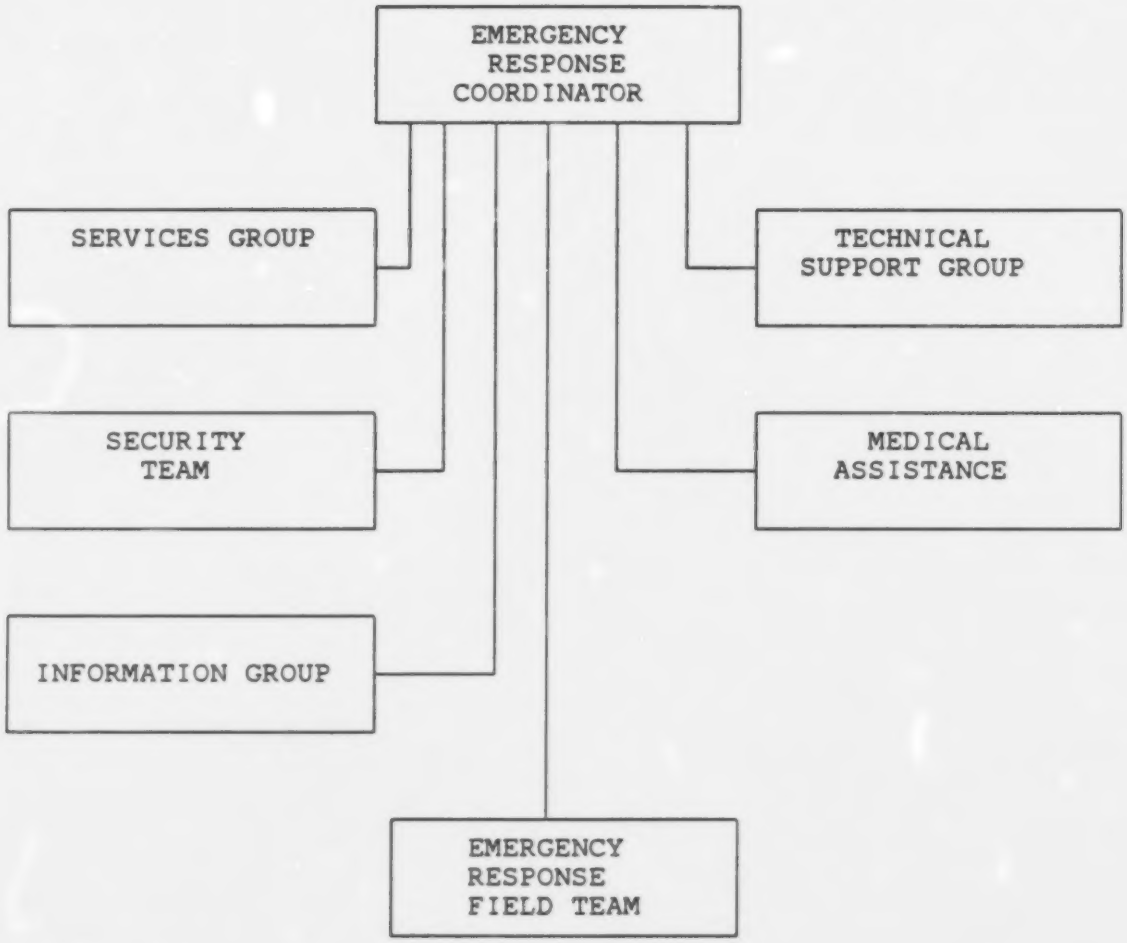
3.0 INITIATION OF RESPONSE

3.1 Introduction

The following sections give specific procedures for responding to and dealing with a variety of emergency events. These are organized in the order that they will be needed, should an emergency occur.

FIGURE I

Structure of OWMC's Emergency Response Organization



It is intended that all users of this Emergency Response Manual be thoroughly familiar with their own responsibilities and with the action which must be performed in an emergency. They will be trained to be familiar with emergency equipment related to their normal operating locations. Finally, they should understand the Emergency Response Organization, its function, and its relationship to the normal site operating organization.

3.2 Alarm Systems

The two Facility alarm systems, one to signal a fire, the second for other incidents, are the primary methods for signalling the discovery of an on-site emergency situation. When either of the alarm systems are activated, usually by pulling a cord or handle on the alarm, a distinctive audible klaxon horn alarm will be sounded in the operating zone of concern. In the alarm system, the operating zones are the following:

1. the incineration plant and organic drum storage and handling building;

2. the incineration tank farm, unloading areas, truck holding areas, and PCB treatment building;

3. the inorganic drum storage and handling, physical/chemical storage tank area and physical/chemical treatment plant and solidification plant;

4. the administration, laboratory and maintenance buildings and gatehouse;

5. the landfill and outlying area;

6. ponds, substations, and other facilities.

The following diagrams, based on floor plans of the buildings in the operating zones, show the locations of alarm pull stations and related emergency equipment locations (to be added when building detail design permits).

Alarms are positioned in each of the operating zones, clearly defined by a sign and contrasting colours and shapes. Fire alarms are red-coloured, square-shaped and are to be activated upon the suspicion of any smoke or flame. The other type of alarms are blue-coloured, round-shaped alarms that are to be pulled in any of the following situations which constitute a defined emergency:

- spill of hazardous liquid, or solid - when judged as being a threat to the health of those in the immediate area or in neighbouring areas;

BUILDING DIAGRAMS

(To be included when finalized)

Floor Plans

Plot Plan

Emergency Alarm Locations

Fire Alarm Locations

Emergency Equipment Location

Utilities Shutoff Points

- hazardous gas release;

- explosion; and

- any other incident that could result in serious injury, or damage, or environmental risk requiring the assistance of emergency response personnel.

When a zone alarm is pulled, an instrument panel signal in a local control room will illuminate. It will also indicate through appropriate signals the specific location of the alarm which has been triggered, on annunciator panels in the incinerator control room, and in the gatehouse.

The person who sounds the alarm will also telephone the local control room from a nearby phone (the control extension xxx) and provide a description of the incident, its location, and preliminary comment on its size and severity. If no call is received in 90 seconds of the alarm annunciator being activated, then the incinerator control room operator will send some personnel to investigate.

Immediate preventive action can then be taken by those directly on the scene, provided that this can be achieved without undue risk. Details for immediate action are described more thoroughly in Section 4.3.

Under all emergency circumstances, it is extremely important that workers realize that the alarm signal should be initiated first. Small incidents such as incipient fires may well be successfully fought by local resources, however, they can also easily escalate into major incidents. It is important that help be summoned before any attempt is made to combat the incident locally.

4.0 IMMEDIATE PREVENTIVE ACTION

4.1 Personal Protection

Unnecessary risks will not be taken during any emergency situation. Personnel responding to emergency situations will arm themselves with adequate safety equipment and will adopt safe procedures.

Evacuation of the on-site area(s) affected by an emergency incident should be considered normal. Any activity to contain or combat an emergency situation should be undertaken only when on-scene management, supervision, and the workers themselves are satisfied that the personal protective equipment and emergency response equipment are both available and adequate in the circumstances.

4.2 Worker Evacuation

When an alarm signal is sounded, all personnel in the affected sector of the site will leave their operations in a safe, shutdown or controlled mode, and evacuate to the designated assembly area for their sector, and then outside the gate if deemed necessary by the Emergency Response Co-ordinator.

These evacuation areas are:

1. For the incineration plant and organic drum storage and handling building: the main door of the maintenance building. Should this be unsafe, the alternate location is the gatehouse on the plant access road. Evacuation of the incineration plant will depend on the judgement of the operators and the Emergency Response Coordinator.

2. For the incinerator tank farm, unloading areas and truck holding areas: the most accessible laboratory door of the administration building. Should this be unsafe, the gatehouse on the plant access road.

3. For the inorganic drum storage and handling building, the physical/chemical storage tank area, and the physical/chemical treatment plant and solidification plants:

the driveway at the north end of the temporary truck holding area. Should this area be unsafe, or should the weather be inclement, the laboratory door of the administration building.

4. For the administration and maintenance buildings and gatehouse:

   (a) the ground floor of the administrative building;
   (b) the maintenance building.

Personnel in the following areas will remian in their areas but be contacted by radio and will be incorporated into the head count by the Security Coordinator:

1. The landfill and outlying areas, the maintenance buildings;

2. The ponds, hydro and other facilities, the normal assembly area of the worker temporarily in those zones.

4.3 First Response

On hearing the emergency alarm, designated people will take immediate action in separate but coordinated ways.

The individual who activated the emergency alarm, may, if the risk is judged small, and if appropriate equipment for personal protection and for emergency response is available, take steps to minimize the spread of the incident. For example, an incipient fire may be contained with a plant fire extinguisher. Small liquid spills may be prevented from spreading by the use of spill control absorbent pillows or bulk absorbent.

It is stressed that this is not an automatic or universal requirement. Judgement may indicate that toxic hazards are significant, or that a fire is too large to fight safely, or in general that the risk is unacceptable, whereupon the local workers should evacuate, removing themselves from danger. Designated members of the on-site emergency response team will proceed to the scene with their equipment. Equipment and supplies are discussed in Section (10.4).

At the earliest possible moment, the Emergency Response Coordinator or one of the three designated Alternates will also proceed rapidly to the control centre in order to activate and man the centre. Should further in-house action to deal with the emergency be appropriate, the Coordinator will take charge in leading plant emergency forces in making the appropriate response to the emergency.

During night shifts or weekends, when the number of workers on site will be less than the normal complement of the Emergency Response Team, rapid, safe shut-down procedures for all of the continuously-operating equipment will be followed by personnel in order to ensure that they can be freed from their routine duties and thus allow them to deal effectively with the emergency.

Further designated members of the Emergency Response Organization that are "on-call" will be summoned by the security guard. These people will respond (call in) and will proceed as quickly a possible to the plant site.

4.4 Assessment

An evaluation of the parameters of the emergency situation must be made quickly by either the Shift Supervisor, who is a member of the Emergency Response Field Team, or the Emergency Response Coordinator. This is of he utmost importance in establishing sufficient and appropriate resources to deal with the emergency, yet avoiding serious over-reaction. It is better to over-react than to fall short in response.

The basic responsibility for the decision to escalate the response lies with the Shift Supervisor and/or the Emergency Response Coordinator, with advice from those present who make the technical assessment of the emergency.

This assessment will be made on the basis of the following:

- ó severity (the nature, size and extent of the problem);
- o urgency (the potential of the event to escalate quickly);
- o threat (the risk of damage); and
- o impact (effect on people, the environment, property, or operations).

A recommendation for escalation of response can normally be developed in the first few minutes of response at the scene of the emergency incident. Extended procedures for Escalation of Response are described in Section 6.

5.0 NOTIFICATION

5.1 Lists

Notification of the occurrence of an emergency will be made by telephone by the Emergency Response Coordinator, or an

individual delegate, to various members of management, civil emergency response authorities, government agencies, and community officials, as required.

These names and the sequence in which they are to be called are shown in Figure ___ (to be compiled). The calls will be made by the Information Coordinator during normal workings hours, and by the Gate House Security during other shifts.

The message to the responsible parties should indicate clearly the nature and level of the emergency, the preliminary information available about its location, the material involved, its quantity, and the activity underway to deal with it. This information will come from the Emergency Response Coordinator, and be given to the receptionist.

5.2 Protocol of Sequence

It is important that the sequence of notification calls be followed, and that the messages be passed to the individuals shown directly, rather than through intermediaries.

6.0 ESCALATION OF RESPONSE

6.1 Establishing Command Post

When the decision is made that a significant emergency exists on-site, response activities expand rapidly. A number of activities occur simultaneously, and are described in the following sections. These are all coordinated by the Emergency Response Coordinator from the Command Post.

The Command Post is the operating base for management and communications for the duration of the emergency. The main location for the Command Post is the east end of the administration building. Should this location be unsafe the alternate location is in the maintenance building. Should both these be untenable, the Emergency Response Coordinator will decide where to locate the Command Post.

Each of the above-mentioned locations is equipped with communications facilities, emergency reference material, equipment and supplies. These resources are detailed in the stock list (to be compiled). They are stored in an emergency response supply cabinet at the Command Post location, reserved for emergencies only. In addition, the Command Post is equipped with dedicated telephone lines reserved for the use of the Command Post participants during emergencies.

While an emergency situation exists, the Command Post is the communications base from which resources are deployed to deal with the emergency. Communications with the Response Team, the site security, the communications centre, and the company management are maintained throughout by radio, telephone, personal conferences and other means.

It is the responsibility of the designated Alternate Deputy Emergency Response Coordinator to ensure that records of all decisions, activities and observations throughout the emergency are kept by means of printed log sheets, written and dictated notes, and tape recordings.

6.2 Expanded Call List

Upon escalation of an emergency event, people and organizations identified in an expanded list are informed of the incident. These are outlined in the call notification lists in Figure II, which are grouped by level of emergency as follows: corporation management and appropriate senior Ministry officials; additional municipal service organizations; additional government agencies, specialist support personnel; and neighbouring businesses, residences and other occupied facilities. These lists include those agencies which require notification by law.

FIGURE 2

Emergency Response Telephone Call List

NAME	TELEPHONE NO.	TIME OF DAY		
		MESSAGE DELIVERED	CALL-BACK MESSAGE LEFT	NO ANSWER
(1) Small, contained (not spreading), handled locally, advise management and MOE.				
(2) Larger, not yet controlled or needing outside resources. Advise managment, MOE and local fire department.				
(3) Major, not controlled, spreading obviously needing additional resources. Advise (list of of 15-20 names)				
(4) Potential to move off-site. Notify civil authorities.				

The Response Team Chief will normally assign a member of the Team, the responsibility for coordinating equipment supplies and communications to the field crew.

The location of On-Scene Control Station will be suitably identified and visible.

6.3 Mobilization of On-site Response Team

After a decision is made (Section 4.4) concerning the level of response needed for an emergency, the Response Team Chief mobilizes his team and their equipment to deal with the emergency and will take action as quickly as possible, supplanting and replacing the people who were first directly involved in dealing with the emergency.

The Response Team establishes an On-Scene Control Station for use as a contact point between the Command Post and all field crews. This On-Scene Control Station should be situated close to the emergency but in a convenient and safe location.

6.4 Mobilization of Off-Site Civil Resources

Under certain conditions and under the direction of the Emergency Response Coordinator, requests for assistance from various civil groups will be made.

Upon the arrival of civil respondents, the Emergency Response Team Chief utilizes and coordinates these resources into the overall firefighting effort. Should more extensive resources be required, additional assistance is requested through the West Lincoln Fire Department. Upon their arrival, control of firefighting activities will be relinquished to the Fire Chief*. During subsequent activity, the Emergency Response Team Chief will be the only official company liaison contact with the Fire Chief. He will in turn provide the Fire Chief with all necessary special information about the plant, operating processes and equipment, and the special properties of the materials stored on site.

In the event of personal injury, the municipal emergency ambulance service is requested, using the municipal civil emergency telephone number, or the specific hospital telephone numbers shown in the telephone call list.

Assistance in the form of hazard and toxicological information relating to the waste materials on-site is available from the waste data sheets prepared for each waste and also the Facility's waste data base comprised of information compiled from the generator, laboratory analysis, and reference material. Additional information as required will be sought from the poison

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* This will be resolved further as the generic Plan is finalized.

control centre when the personal injury consists of exposure to toxic materials.

In certain types of emergencies, the Municipal, Regional or Ontario Provincial Police will be requested to participate.

6.5 Support Groups

As part of the mobilization of the Command Post, the designated support staff makes ready their office space and communication facilities. These people provide telephone, radio, and other communications assistance for the emergency response activities, under supervision of the Emergency Response Coordinator.

Appropriate technical support is mobilized for the specific emergency incident. The Technical Support Group is a designated entity in the Emergency Response Plan, with responsibilities described in Section 7.

These on-site support group activities, including engineering, environmental, medical and related assistance are based in the laboratory office of the administration building, with access to computer and other relevant facilities.

6.6 Response - Facility Close-Down

Continuing operation of the Facility is subject to the assessment of the seriousness of the emergency and the decision of the Emergency Response Coordinator aided by the Shift Supervisor and the Response Team Chief. All efforts will be made to maintain operation of the rotary kiln incinerator. In the event of a major emergency, the normal operations of the Facility are suspended and all units left in a secure state. Operations directly involved or affected by their proximity to the emergency will be shutdown if deemed necessary, with consideration for personal safety of the operators.

Operating units not directly affected by the emergency will maintain normal operation. Materials in process are to be left in a safe and secure state. Small items of operating equipment not integral with major continuous unit operations are shut-off and left in a safe state.

All commercial trucks on-site are directed to park in the safest possible location at the discretion of the Emergency Response Coordinator and the Security Coordinator.

6.7 Security

When an emergency response is initiated, the Security Coordinator, as part of his responsibilities, responding for the duration of the emergency to the Emergency Response Coordinator, carries out the following:

1. All entrance gates to the operating site are closed to all traffic except that related to the emergency.

2. One security person remains continuously at the main gate, under direction of the Security Coordinator, to achieve traffic control. Additional security personnel will be delegated to control other site perimeter gates if they are to be used for emergency traffic.

3. The Security Coordinator initiates liaison with the Niagara Regional Police, and the Ontario Provincial Police, and continues this liaison with them and with any other law enforcement agencies which may become involved throughout the incident.

4. The base for operations of the security system, and the normal location of the Security Coordinator throughout the

emergency, is in the Command Post, in close contact with the Emergency Response Coordinator.

6.8 Response Team

The Response Team, under the direction of Response Team Chief, is the unit which responds to all the emergencies.

When the Chief arrives at the scene of an emergency, the Chief of the Response Team assumes command of the situation from the individual who detected the emergency and sounded the alarm, and from anyone who may have given early effort in combatting it. Other members of the Response Team proceed directly to the scene of the emergency, from their normal working locations, and join the team.

Equipment for the Response Team (shown in detail in Section 10.4) is maintained in a ready-state and stored in designated locations and in the emergency response vehicle which is normally parked in the maintenance building garage. A designated member of the team brings this vehicle with its equipment to the closest possible access point to the scene of the emergency.

Personal protective equipment beyond that normally worn during working hours is included in the resources of this vehicle.

The Response Team is trained in firefighting techniques, and is capable of dealing with fire emergencies beyond the scope of local fire extinguishers and equipment.

The Response Team is also specifically trained in providing spill counter-measures, enabling them to deal with unexpected release of hazardous liquids and sludges. Specific specialized training in hazardous materials emergencies provides them with the abilities to deal with explosions and gas release involving materials handled on-site.

6.9 Rescue

In situations where personal injuries have resulted from an emergency situation or where evacuation of the site facilities reveals people unaccounted for, rescue procedures are initiated with high priority.

These procedures are implemented by the Response Team as part of its specialized capabilities, with participation and assistance from the medical personnel.

The Rescue Team is equipped with personal protective equipment. This includes self-contained breathing apparatus to enter hazardous areas.

The search procedure involves a minimum of two people working together in the emergency area, maintaining contact by radio or other means with a third member of the team who remains at the access point as backup.

Injured individuals are given essential medical aid as quickly as feasible, and removed form the scene of the emergency using suitable paramedic techniques.

6.10 Spills

Specialized emergency response equipment specifically selected for use in combatting hazardous liquids spills is used to contain and control them. The first response to a spill consists of containing it against further spread. This is considered in the design (dykes, curbs, drains, sumps, etc.) of the Facility. Response actions can include using absorbent pillows, pads or bulk absorbent material to absorb liquid and physically prevent it from spreading laterally.

Removal of the spilled material as a liquid or on the absorbent, depends on the nature of the material and its specific hazards.

The normal technique for dealing with either bulk liquids or absorbed liquids is to transfer them physically by pumping or otherwise transferring them into suitable containers. Normally, salvaged spilled material will be treated in the normal routine of site operation.

The Technical Support Group will monitor surface water and adjoining soil for spread of contamination wherever escape is possible, and wherever the spill is on unpaved land. The Support Group will secure the services of a hydrogeologist if contamination persists in the soil or has the potential to enter the ground water.

6.11 Site Services

During a major emergency the availability of both utilities and shop services are important to the Emergency Response Team.

The normal plant maintenance crew assists the Response Team and the Emergency Response Coordinator, as directed, by arranging for shut-off of site utilities when this is necessary to minimize the risk of further damage. The location of main shut-off points for each of the site utilities: electricity, gas, and water, is shown on the site plan (Appendix).

Skilled trades are mobilized by the Services Coordinator, in order to be available to the Response Team. During evening and night shift and weekends, when maintenance trades present on-site may be insufficient in number, facility maintenance employees will be called in from home. Additional trades and services may be brought in from off-site local contractors, commercial tradesmen, or other service companies to augment both the range of skills and the number of people available. Professional engineering involvement in the emergency response is provided through and under the control of the Services Coordinator.

In the event that the incoming utilities to the site are shut off, auxiliary power and telephone will be provided, with priority, by the maintenance organization.

6.12 Transportation

The availability of various vehicles as a service to the emergency response activities is assured and coordinated by the Services Coordinator.

As the Command Post is mobilized, the Services Coordinator arranges for several vehicles, including both automobiles and trucks, to be located at or near the Command Post under his control. These will be utilized by the Emergency Response Team

and the Emergency Response Coordinator for movement of equipment and supplies, for priority messages, and for pickup off-site of additional people, supplies and equipment.

6.13 Evacuation of Employee Site-Wide

When a major emergency exists, the Emergency Response Coordinator may decide to evacuate all personnel from the site except for those directly involved in dealing with the emergency, and in supporting these activities.

The preliminary evacuation of the plant sector in which the emergency has occurred has been described in Section 4.2. Should the emergency escalate, other sectors of the plant evacuate similarly to their designated safe assembly area.

Each supervisor oversees the evacuation of his part of the Facility, checking visually that the building facilities including washrooms, stockrooms, and other less-used areas are secure and empty. Each supervisor directs the evacuation of his part of the Facility, including any visitors who may be on-site at the time, under escort of employees.

When a major emergency has been declared, the Security Coordinator working with operating supervision, initiates a head count.

As one step in this, a delegate from the Security Team confirms from the visitors log at the reception desk in the administration building and at the gatehouse, how many visitors are on-site at the time of an emergency. The head count procedure confirms their evacuation along with the employees.

Combining this with the normal work force roles gives him the reference from which to confirm that all personnel have safely reached the assembly points.

When all personnel have been accounted for, the Emergency Response Coordinator may advise personnel to vacate the Facility area. At that time, employee automobiles may be removed from the parking lot, provided that this can be achieved in complete safety and without interfering with access for emergency vehicles.

The departure of commercial transport trucks to an alternate assembly area is to be requested in the event of an evacuation. The Security Team will ensure that this is done quickly with minimum impact on traffic and without inhibiting access to the site by emergency vehicles. This may involve spacing the

departure of the trucks, use of alternate exit gates, alternate road routes, and the possibility of police escort for efficient movement of groups of trucks.

At the same moment, the Information Coordinator under the directions and supervision of the Emergency Response Coordinator, notifies the potentially affected local residents and the Regional officials. Details are provided in Section 6.15.

6.14 Security

Activities described in Section 6.7 will continue. The Security Coordinator, with one of his crew at each gate, coordinates all traffic movement in and out of the plant.

This will include, with the highest priority, entrance of municipal emergency response vehicles including fire department, ambulances, and police vehicles.

In addition, traffic control ensures that the roadways are kept clear of outside traffic, and in particular, prevent sightseers from congesting the driveways or access roads. On public roads the police will be requested to perform this function.

6.15 Public and Media Information Centre

Communications with neighbours, the public, and the media are important in any emergency. The Information Coordinator coordinates and provides support services for facilitating external communications throughout the duration of the emergency incident. For this, he will respond to the Emergency Response Coordinator.

Early in the development of a major emergency incident, the Information Coordinator mobilizes a communications centre. This is in a location (to be defined) separate from the Command Post, but in close contact with it. Alternate locations are provided off-site in the event that emergency increases the risk to corporation and media personnel unacceptably.

The communications centre is equipped with information handling facilities including typing, copying and telephones.

As an operating policy of management, the communications program is carried out to ensure that accurate information is passed on in a timely manner to all interested and concerned parties. These include Corporation employees, both on- and off-site, management, media - newspapers, radio, television and others - community neighbours, public interest groups and local civil authorities.

At an early stage in any emergency, the Information Coordinator gathers the facts about the incident and notifies senior management and the appropriate provincial and local authorities, describing in suitable detail what happened, how it happened, the materials involved, the magnitude of the event, the potential risks to health, environment, or property, and the action being taken to deal with it by on-site forces and by the civil authorities. A statement is released to the press and public by management, in print and possibly accompanied by a verbal press conference presentation.

The Information Coodinator will also deal with inquiries from outside the Facility, from media and public, providing comprehensive and accurate responses to any questions related to the emergency incident.

7.0 SPECIAL EMERGENCIES

7.1 Introduction

Some types of emergency may arise through outside causes, unrelated to any accident or incident in the plant operations. The site Emergency Response Organization will be prepared to deal with any effects of these on the site operation.

Some of these emergencies may not develop as suddenly as on-site incidents, and certain lead-time is available for preparation to deal with them.

7.2 Threats and Civil Disorders

Site response under these circumstances is coordinated as usual by the Emergency Response Coordinator. Action is directed toward protecting the site, its occupants, and property from the effects of the off-site emergency.

In the specific instance of bomb threats received by telephone or (rarely) by mail or other means, evacuation will be considered only if deemed necessary, coordinated with specialized search procedures carried out with the assistance of the Regional Police department and military.

7.3 Natural Disasters

The Emergency Response Organization responds also to protect the site and the employees against the effects of natural disasters such as tornadoes, lightning, floods, and earthquakes.

In instances where there is prior warning, the first response is to notify personnel on-site of the threatening natural disaster.

In the event that these incidents occur unexpectedly and quickly, response will be appropriate to the situation, under the judgement of the Emergency Response Coordinator as leader of the Emergency Response Organization.

8.0 RETURN TO NORMAL OPERATING CONDITIONS

8.1 Site Inspection

Throughout the course of an emergency incident, periodic assessments by the Emergency Response Coordinator will address the question of completion of containment and the success of the Response Team in dealing with the incident. This may include direct inspection, either individually or with the aid of specific experts from the Technical Support Group, or others, as appropriate. Periodic status reports with the aid of the Technical Support Group will ensure that comprehensive information is available for the status of the emergency to be assessed accurately and effectively.

8.2 Assessment

The decision that the emergency incident has progressed to its conclusion will be made on the basis of the same criteria as used in determining the onset of the emergency (Section 4.4).

Once it has been established by the Technical Support Group that the criteria of severity, urgency; risk of damage and impact have been reduced to an acceptable level, the Group will recommend to the Emergency Response Coordinator that the situation is no longer an emergency condition.

8.3 Decision on De-Escalation of Response

Normally an orderly wrap-up and termination of emergency activities will follow logically from the completion of the response measures to deal with the emergency situation.

The management responsibility for deciding and announcing that the emergency has been dealt with sufficiently lies with the Emergency Response Coordinator, with advice from appropriate parties such as the operating Shift Supervisor, Operations Manager and the Director of Operations, and with the concurrence of the Ministry of the Environment when appropriate.

An announcement of the termination of the emergency status on-site will be made through the communications links established.

8.4 Notification of Authorities

The Emergency Response coordinator, assisted by the Information Coordinator, notifies management and various outside agencies of the termination of the emergency. Contact will normally be by telephone, using the directory and the emergency response telephone list.

8.5 Resumption of Site Operations

The decision to resume normal site operations will be considered separately from the decision that the emergency conditions no longer exist. The determination that it is safe to return to normal operations is taken by site management with advice from the Emergency Response Coordinator after consultation with his technical an support advisors, and with the concurrence of the corporation management.

8.6 Return of Evacuees

Employees will be advised via telephone, by management and supervisors, when they should return to work.

9.0 POST-INCIDENT PROCEDURES

9.1 Post-Incident Clean-up

After emergency status is ended, property damage and/or the environmental contamination as a result of the emergency, will be assessed.

Clean-up will proceed with urgency to remove any hazardous material, using appropriate spills containment and cleanup techniques, or specialized techniques suitable to the specific material involved. Clean-up will also include property/ environmental restoration (i.e: replacement of removed contaminated soil, with clean fill and top soil for the purpose of revegetation, etc.).

Disposal of contaminated material will usually be through the normal processing operation of the site facilities.

9.2 Replenishing Safety and Emergency Supplies

Maintenance of the emergency response system will be carried out by the members of the Response Team and the site maintenance group.

Equipment used in the emergency will be inspected, restored to its normal operating condition, and placed back in storage for use in future emergency situations.

Consumable supplies used during the incident will be replaced first from stores inventory, then by purchase. An inventory list and log of this equipment appears in Section (10.4), and is copied in the storage cabinets where the equipment and supplies are normally stored.

9.3 Investigation Analysis and Reporting on Incident - In-House Report

Immediately after any emergency incident, management will assign a suitable team to evaluate the causes, to critique the response action, and to develop any conclusions and recommendations for accident prevention and improvement of the handling of future emergencies. The level of the investigation will depend upon the seriousness of the incident.

The investigation team will be drawn from management, technical staff, and operating staff appropriate to the nature of the incident. The mandate for the investigation will be described on a case-by-case basis by the Emergency Response Coordinator or his Alternate. This will normally include:

1. gathering detailed information through first-person interviews and reports, from discussions with all people directly involved in the incident including the occurrence as well as response actions;

2. arranging and implementing technical inspection of the equipment, buildings, physical and chemical analysis of material samples; and any other scientific or engineering studies deemed appropriate to the investigation of the causes and results of the incident;

3. assessing all information obtained in order to establish the cause or causes of the incident and to prepare recommendations for avoiding or minimizing the risk in future from similar incidents;

4. any other objectives appropriate to the specific incident.

This in-house report will be a thorough, introspective, objective appraisal of the emergency. It will balance technical and procedural factors as appropriate to its objectives.

9.4 Environmental Assessment

Accidents and incidents which involve spills of hazardous materials, movement of materials off-site through spills, gas emissions, explosions or fires, and generally any event which had environmental impact, will be subject to scrutiny during the inquiry for the environmental effects. The sources, pathways, and impact on various receptors will be evaluated appropriately, with assistance from suitable technical support staff, either in the corporation or from the Ministry of the Environment, or from external expertise such as consulting organizations.

9.5 Accidents and Injuries

An Accident Report will be prepared, using the prescribed reporting format for any emergency incident in which personal injury or fatality results.

This report will generally involve information relevant to the in-house investigation described previously.

9.6 Department of Labour

Under certain prescribed conditions, the Ministry of Labour will will establish the terms of reference for an investigation into

the causes of the incident which resulted in personal injury or unsafe working conditions.

This investigation may take place independently but concurrently with the Post-Incident Procedures. Under some circumstances, concurrent requirements of the Corporation and various government agencies including the Ministry of Labour, Ministry of the Environment, and others, may be best met by carrying out the fact-finding portion of the study jointly, in the interests of achieving effective results in the shortest reasonable time. Under some circumstances a joint report may be issued, in other instances, each agency may draw on a common pool of fact-finding studies and carry out its own assessments and report its own conclusions.

10.0 PREPAREDNESS

10.1 Manning of On-Site Teams

The Emergency Response Organization will be staffed entirely by Facility personnel. Suggested candidates to staff the organization are summarized in Table I. When the Facility is constructed and the operating organization is functional, the emergency response staffing can be finalized.

TABLE I

Emergency Response Organization Nominees

EMERGENCY RESPONSE ORGANIZATION TITLE	EMERGENCY RESPONSE ORGANIZATION ALTERNATIVES	SUGGESTED DESIGNATE AND ALTERNATE (A List of Candidates Available to fill the Position)
Emergency Response Coordinator	Deputy Emergency Response Co-ordinators Three alternates	This position could possibly be filled by the senior safety and fire engineer on staff.
Response Team Chief (on scene)	Three alternates	Four individuals will be selected and trained from the Facility foremen and operating staff.
Field-Coordinator (safe area)		One of the Response Team Members.
Response Team Member	Team Member (number to be determined)	Trained group, selected from the Facility operators and trades people.
Security Coordinator		
Technical Coordinator		
Technical Support Group		Chemical engineers, analytical laboratory supervisor.
Information Coordinator		
Services Coordinator	Three alternates	
Medical Assistance		Facility physician or nurse from on-site during the day shift and on-call during off-shift hours.

10.2 Training

The objectives of training programs for OWMC Facility employees involved in the emergency response program are:

- to make the Response Team aware of the potential hazards they may encounter;

- to provide the knowledge and skills necessary to perform the work as a team, with minimal risk to health and safety;

- to make team members aware of the purpose and limitations of safety equipment; and

- to ensure that team members or workers can safely avoid or escape from emergencies.

Emergency response management and supervising personnel and team workers will attend training sessions that apply to their individual jobs and responsibilities in case of an emergency, as well as training sessions that provide an overview of site related emergencies and the means of controlling those emergencies.

The Emergency Response training program will include the following:

1. Facility safety policies;

2. the employment of safety apparel such as hard hats, steel-toed boots, and goggles;

3. safe use of emergency equipment;

4. use, care and limitations of personal protective clothing and equipment;

5. nature of anticipated emergencies, site specific hazards such as:

   - o spills,
   - o gas releases,
   - o fire,
   - o explosions;

6. first-aid,

7. firefighting with specialized training adapted specifically to the Facility;

8. handling, containment, and transportation of hazardous materials;

9. handling emergencies and self-rescue;

10. rules and regulations for emergency control.

The emergency training recommended by job category is summarized in Table II.

10.3 Medical Treatment/First-Aid

Medical treatment may range from bandaging of minor cuts and abrasions to life-saving techniques. In many cases, essential medical help may not be immediately available. For this reason, on-site emergency personnel must be trained in first-aid techniques, to establish and maintain telephone contact with medical experts (e.g., toxicologists), and to establish liaisons with local hospitals and ambulance services. The emergency response team must be trained in the following:

- emergency treatment such as first-aid and cardio-pulmonary-resuscitation. Training must be thorough, frequently repeated, and geared to site-specific hazards, i.e., fires, spills, and airborne emissions;

- liaison with local medical personnel, for example: 24-hour on-call physician, medical specialists, local hospitals, ambulance service, and poison control centre;

TABLE II

Emergency Training Recommended by Job Category

	Operator or General Site Worker	On-Site Management and Supervisors	Health & Safety Staff
Emergency help and self-rescue: emergency drills or exercises	Yes	Yes	Yes
Response to emergencies	Yes	Yes	Yes
Follow-up investigation and documentation		Yes	

A record of training will be maintained in each employee's personnel file to confirm that every person assigned to a task has had adequate training for that task, and that every employee's training is up-to-date.

- in the operation of emergency first-aid stations; these must be well supplied and restocked immediately after each emergency.

10.4 Emergency Equipment

Emergency equipment is essential for the rescue and treatment of victims, to protect response personnel, and to contain chemical spills and fires. Recommended on-site equipment and supplies for emergency response are summarized in Table III.

Some regular equipment such as pumps can double for emergency use. However, there will be designated emergency and firefighting equipment.

All equipment must be in working order, fueled, and available at all times.

Safe and unobstructed access to all firefighting and emergency equipment is rquired.

- all equipment repairs will be carried out promptly;

- inspect all and refill any empty self-contained breathing apparatus (SCBA) tanks and prepare them for emergencies;

- special equipment should be obtained i.e. absorbents.

TABLE III

On-Site Equipment and Supplies for Emergency Response

Personal Protection	Medical	Hazard Mitigation
o Acid hood and rubber suit and boots o Compressed air cylinder with mesh airline and nose cap o Escape SCBA or SCBA, which can be brought to the victim to replace or supplement his or her SCBA o Fresh cylinder with 2 hoses and mask on a portable buggy-wristlets, ropes, and shoulder harnesses o Fresh air mask on each floor o Gas proof suits o Wristlet and rope set road kit and gas emergency kits	o Air splints o Antiseptics o Blankets o Decontamination solutions appropriate for on-site chemical hazards o Emergency eye wash o Emergency showers or wash stations o Ice o Reference books containing basic first-aid procedures and information on treatment of specific chemical injuries o Resuscitator o Safety harness o Stretchers o Water, in portable containers o Wire basket litter (Stokes litter) which can be used to carry a victim in bad weather and on a difficult terrain, allows each decontamination of the victim, and is itself easy to decontaminate	o Firefighting equipment and supplies o Spill-containment equipment, such as absorbents and oil booms o Special hazardous-use tools such as remote pneumatic impact wrenches, nonsparking wrenches and picks o Containers to hold contaminated materials

10.5 Equipment Inspection and Maintenance Routine

The following safety and emergency equipment must be inspected monthly and maintained accordingly:

1. sprinkler systems and their risers;
2. sectional control valves;
3. manual trips for deluge systems;
4. special fire protection systems, such as CO_2 or Halon;
5. fire hydrants and monitors;
6. personal protective equipment;
7. special tools or kits for specific hazards;
8. fire extinguishers;
9. fire alarm systems;
10. first-aid kits;
11. decontamination showers/baths;
12. respirators;
13. internal communications systems - radios, telephone, public address systems.

The equipment listed above will be available in each of the following operating zones of the Facility:

1. the incineration plant, organic drum storage and handling building, and the PCB treatment building;

2. the incineration tank farm, unloading areas, and truck holding areas;

3. the inorganic storage and handling, physical/chemical storage tank area; physical/chemical treatment plant, and solidification plant;

4. the administration and maintenance buildings and gatehouse;

5. the landfill area;

6. water storage ponds, hydro, and other facilities.

Equipment requirements will be different in locations 4, 5 and 6 from those in locations 1, 2 and 3.

The appendix will contain supporting and explanatory material related to the ERP. Such information will include:

- Emergency Response Checklist for Operating Personnel;

- Emergency Response Checklist for Maintenance, Laboratory and Administration Building Personnel;

- Emergency Response Checklist for Landfill Area Personnel;

APPENDIX

INCLUSION IN APPENDIX:

- Supplementary Organization, Decision Making and Action Flow Charts;

- Examples of:
  - Waste Date Form,
  - Waste Safety Sheet;

- Facility layout diagrams for each Proven Area etc;

- Contact/Directory Information for:
  - OWMC internal and external personnel,
  - Response Services and Contractors,
  - Response Equipment and Supplies Acquisition,
  - External Notification of Authority.

11.0 OFF-SITE EMERGENCY RESPONSE PLANNING

11.1 Background

When the facility is operating at full capacity, approximately 80 waste-hauling trucks and 10 additive and reagent trucks are expected to come to the facility, daily. Most of these vehicles will be required through contract to travel along Regional Road #24 and Highway 20 from the QEW in order to access the facility. Waste generated from certain areas within the Region of Niagara will, in taking the most straightforward and shortest route to the facility, travel along roads other than the preferred route. However, these truck numbers are expected to total less than 15 trucks a week.

11.2 OWMC Commitment

Although OWMC will be implementing the following safeguards:

- using only accredited and licensed haulers;
- designating access route to be taken;
- controlling the scheduling of shipments;
- preparing and issuing specific requirements for every shipment (type of shipping container, safe hauling, emergency response, actions to be taken in the event of an accident, etc.)

- placarding and shipping documents;
- commitment to assist local response organizations.

locating the waste treatment facility in the Township of West Lincoln will result in additional trucks on local and regional roads, carrying hazardous commodities (some special wastes and additives and reagents). To ensure a proper and timely response to spills that may occur as a result of a traffic accident, and in an effort not to unduly burden local communities and municipalities, through which trucks bound for the OWMC facility pass, the Corporation is committed to co-operate with, and assist local municipal and regional authorities in:

- preparing and integrating emergency response plans;
- training of response personnel;
- selecting and acquiring necessary response equipment;
- providing technical advice on the nature of spilled material and recovery/clean-up procedures;
- providing response assistance to local response organization with respect to <u>any</u> incident (not necessarily OWMC-related);
- accepting contaminated material recovered during clean-up of an accident site.

In addition, OWMC will share with the local and municipal authorities the results of the Corporation's access route monitoring findings and actions or directives issued by OWMC to

the transporters of dangerous commodities, with respect to access route travel, truck inspection, truck washing, etc.

11.3 Emergency Response Planning Working Group

During the period of August 1987 to March 1988, meetings were held with representatives of the 12 area municipalities' Emergency Control Groups and with the Region of Niagara's Emergency Measures Organization to discuss OWMC's draft on-site emergency response plan. The meetings also provided the opportunity for the Corporation to initiate the development and coordination of Off-Site Emergency Response Plan(s), through the establishment of an Emergency Response Planning Working Group (ERPWG). The group consists of a representative from each municipality, the Region and OWMC. Additional resource personnel also participate as required, i.e., representatives of the Ministries of Health, Transport and Environment, Solicitor General's Office, OPP, Niagara Regional Police, etc.

The objective of the ERPWG is to present a plan or process to formulate an integrated Emergence Response Plan(s) to the Hearing Panel, which has the acceptance of OWMC, the Region and the Municipalities.

The ERWG will identify the gaps and weaknesses in existing local and regional emergency response capabilities, assess options for

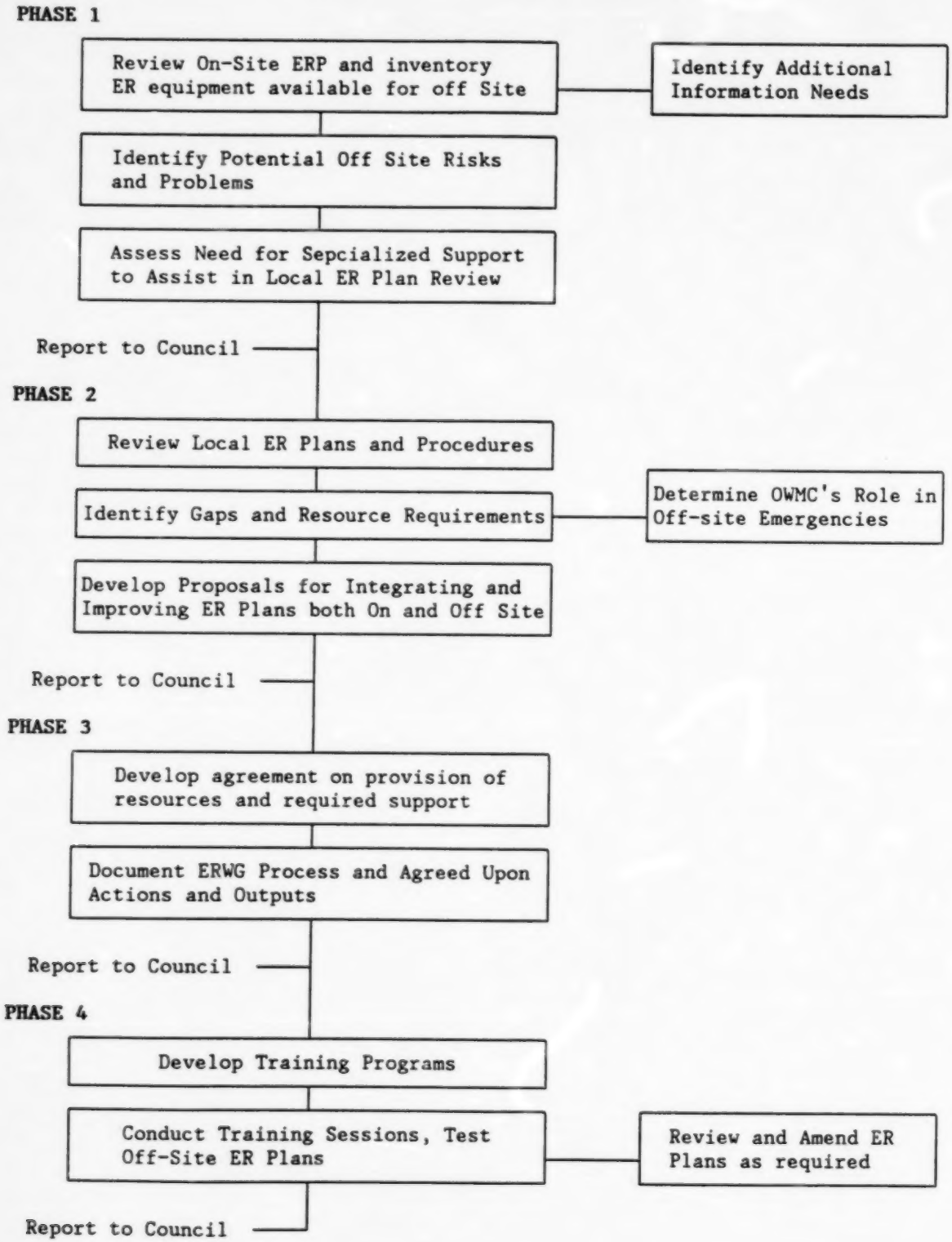
strengthening emergency response programs, and ensure that a coordinated emergency response strategy which takes into account OWMC's operations and capabilities will be in place prior to the commencement of operations should the facility be approved. OWMC has agreed to provide secretariat support for the ERWG as well as specialist ER services where these are required to assist the ERWG to complete its work. In addition, the OWMC will assist in the training of emergency response personnel, the acquisition of necessary response equipment, and the provision of additional mobile equipment from the Facility and technical advice on the nature of spilled material and recovery/clean-up processes.

At the initial Emergency Response Working Group meeting (August, 1988), it was agreed that OWMC would prepare a schedule of activities that would require completion, in order for the Working Group to achieve its objectives. The flow-chart (Figure 3) illustrates the sequencing of activities that the ERPWG will likely have to undertake in its effort to ensure effective off-site emergency response to an accident or spill involving hazardous waste.

11.4 OWMC Information Inputs

Emergency Response planning activities of the Working Group will be based on the perceived risks and the resource requirements

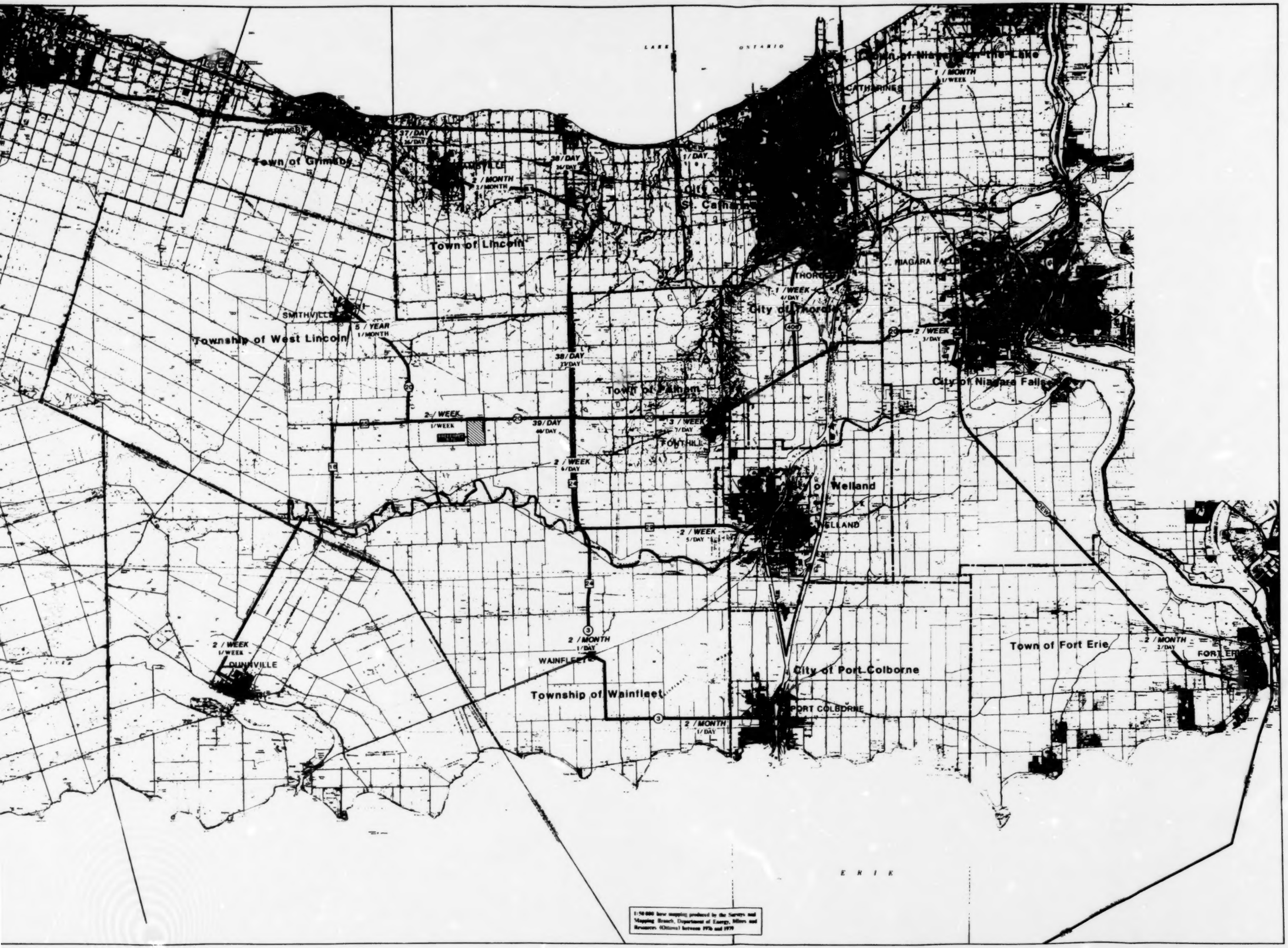
FIGURE 3 - ERPWG BASIC ACTIVITIES


PHASE 1
Review On-Site ERP and inventory ER equipment available for off Site
Identify Additional Information Needs
Identify Potential Off Site Risks and Problems
Assess Need for Sepcialized Support to Assist in Local ER Plan Review
Report to Council
PHASE 2
Review Local ER Plans and Procedures
Identify Gaps and Resource Requirements
Determine OWMC's Role in Off-site Emergencies
Develop Proposals for Integrating and Improving ER Plans both On and Off Site
Report to Council
PHASE 3
Develop agreement on provision of resources and required support
Document ERWG Process and Agreed Upon Actions and Outputs
Report to Council
PHASE 4
Develop Training Programs
Conduct Training Sessions, Test Off-Site ER Plans
Review and Amend ER Plans as required
Report to Council

(equipment, training and manpower) to adequately address potential accident events. To this end, OWMC will provide information on the following subjects:

Truck Volume

The anticipated number of trucks bringing waste and additives and reagents to the OWMC facility, is illustrated for the Region of Niagara in Figure 4. Two sets of truck frequencies are presented for the various access routes to the Facility. Scenario 1, represented by the bottom or lower number associated with the various roads, assumes the Facility receives special waste from "the plant gate out", that is, more of the locally generated waste would be sent to the Facility, relative to more distant sources. In this event, over 75% of all special waste generated within the Region, would come to the Facility. Scenario 2, represented by the upper number associated with the various access routes, assumes that waste coming to the Facility from any given region of Ontario, are in proportion to the total amount of waste generated in the province. In this scenario, 5% of all special wastes generated within the Niagara Region would come to the Facility.



1:50 000 base mapping produced by the Surveys and Mapping Branch, Department of Energy, Mines and Resources (Ottawa) between 1976 and 1979

OWMC Ontario Waste Management Corporation

Consultant

Legend:

Number of Trucks Carrying Special Wastes

1/DAY **Scenario 1**
2 WEEK **Scenario 2**

Access Route From Each Waste Source

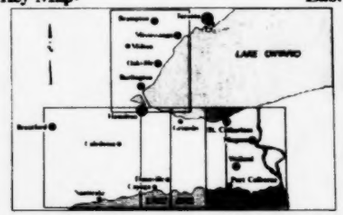
406 **400 Series Highways**

20 **Provincial Highways**

24 **Niagara Regional Roads**

Municipal Boundary

Key Map: East



Sources / Notes
Projected Number of Vehicles Carrying OWMC Special Wastes Along Routes Within the Region of Niagara.
Based on Typical Operation for a Plant Capacity of 150,000 Tonnes of Special Wastes Per Year.

Transportation of Special Wastes in the Region of Niagara

Figure 4

Waste Classes

The anticipated wastes to be transported to the OWMC Facility for treatment have been classified into 14 categories, based upon potential hazards and chemical characteristics. The purpose of the classification is to provide the ERPWG and associated Fire Chiefs with information as to the potential dangers associated with the various wastes and also to assist in evaluating emergency response requirements.

Appendix A explains the classification procedure and presents the following information for each waste class:

- Description;
- Typical Components;
- Hazard due to flammability, toxicity and corrosivity;
- TDG class;
- Tonnes/yr expected at Facility (pumpable and non-pumpable);
- Trucks/yr expected at the Facility (pumpable and non-pumpable);
- General Comments.

Emergency Response Equipment at the Facility

The OWMC Facility is being designed and equipped to be self-sufficient with respect to responding to on-site emergencies. The emergency response equipment and resources necessary to achieve this will be made available for off-site use, to the maximum degree possible, as long as the Facility's emergency response capabilities are not jeopardized.

The following is a list of mobile emergency response equipment proposed for the Facility:

- one tripple-pumper fire truck
- one command vehicle
- one emergency response vehicle
- one vacuum truck

Daily Truck Schedules

All waste received at the OWMC Facility will be scheduled. OWMC will make available to interested municipalities, the daily schedules for waste-carrying truck arrivals.

Risk Evaluation

Successful planning and preparedness for emergencies must be based on knowledge of risks and the areas threatened by potential emergencies.

OWMC will present the findings of an Accident Risk Evaluation currently being conducted for both the Facility and the access roads, to the ERPWG, for use as a planning tool.

Dispersion Modelling

When the OWMC Facility is in operation, the capability of conducting real-time dispersion modelling will exist. This technique will indicate the tragetory of gas or fumes down-wind of an accident. Armed with this and waste characteristics information, that OWMC will make available, emergency response personnel can more effectively combat emergency situations.

APPENDIX A

WASTE CLASSES

OVNC Waste Group	UCD #	Description	Typical Components	Hazard due to: Flammability	Health	Corrosivity	Tonnes/year Pumpable	Tonnes/year Non-Pumpable	Trucks/year Pumpable	Trucks/year Non-pumpable	Comments
1. Organic Sludge and Still bottoms	247	Halogenated still bottoms	(i)resin & plastic,(ii)methylene chloride	(i)	(ii)	N	265		17.7		
	248	Non-halogenated still bottoms	(i)ethylene glycol (ii) & (iii) (iii)alcohol, (iii)toluene	(ii) & (iii)	(iii)	N	353	707	23.5	47.1	
	252	Solid or Sludge Tannery Wastes	(i)leather shavings	N	N	N		2655		177.0	
	257	Phenolic Wastes	(i)phenols	N	(i)	N	883		58.9		mostly waste waters
	261	Polymeric Resin	(i)resins, (ii)fibreglass, (iii)urethanes	(i) & (iii)	N	N		2650		176.7	
	263	Other Polymeric Wastes	(i)resins, (ii)polyethylene wax, (iii)oil & grease	(i)(ii)(iii)	N	N	1148	618	76.5	41.2	
	446	Degreasing Sludge	(i)oil & grease, (ii)paint, (iii)solvent	(i)(ii)(iii)	N	N	883		58.9		
	523	Tank Bottom Sediments	(i)solvents, (ii)adhesives	(i)	N	N		883		58.9	
2. Solvent and Organic Solution	211	Halogenated Solvents with Heavy Metals	(i)halogenated solvents, (ii)heavy metals (iii)oil & grease	OVNC Waste G	(i) & (ii)	N	618		41.2		
	212	Halogenated Solvents with Other Metals	(i)acetone, (ii)toluene (iii)methylene chloride	(i) (ii)	(ii) (iii)	N	88		5.9		
	213	Other Halogenated Solvents	(i)halogenated solvents	N	(i)	N	441		29.4		
	214	Non-Halogenated Solvents with Heavy Metals	(i)mineral spirits, (ii)varsol (iii)heavy metals	(i) (ii)	(iii)	N	530		35.3		
	215	Non-Halogenated Solvents with Other Metals	(i)aromatic hydrocarbon, (ii)ketones	(i) (ii)	N	N	265		17.7		
	216	Other Non-Halogenated Solvents	(i)toluene, (ii)xylene	(i) (ii)	(i) (ii)	N	265		17.7		
	217	Unspecified Solvents	(i)organic solvents, (ii)naphthas, (iii)pigments	(i) (ii)	N	N	883		58.9		
	221	Organic Liquids with Metals and Halogens	No waste streams in the survey, therefore unable to identify any components.	N	N	N	44		2.9		
	222	Organic Liquids with Halogens Only		N	N	N	4		0.3		quantities are OVNC estimates
	223	Organic Liquids with Metals Only		N	N	N	18		1.2		
	224	Other Organic Liquids	(i)solder flux, (ii)lead, (iii)zinc	N	N	N	176		11.7		
3. Oil and grease	281	Waste Oil and Mixed Oil	(i)oil & grease	(i)	N	N	883		58.9		
4. Oil/Water mixtures	283	Oily Mud, Sediment and Water	(i)oil & grease, (ii)grit	(i)	N	N	2650	883	176.7	58.9	Sludge with some water

OWMC Waste Group	IWCD #	Description	Typical Components	Hazard due to: Flammability	Health	Corrosivity			Trucks/year Pumpable	Non-pumpable	Comments
5. Organic and Oily Residues	1264	Thermoset Wastes	[(i)mineral spirits, (ii)vegetable oil	(i) (iii)	N	N	9		0.6		
	1202	Oily Tank Bottoms	[(i)oil & grease, (ii)rubber, (iii)carbon	[(i)(ii)(iii)]	N	N	354	88	23.6	5.9	
	1204	Oily Acidic Solids	[(i)oil & grease, (ii)grit	(i)	N	N		1766		117.7	
	1205	Oily Alkaline Solids	90% water	N	N	N	9		0.6		
	1206	Oil/Water Separator Sludge	water	N	N	N	265		17.7		
	1208	Oily Wastes with Heavy Metal Contaminants	[(i)oil & grease, (ii)iron	(i)	N	N	353	530	23.5	35.3	
	1209	Oily Wastes with Water	[(i)oil & grease	N	N	N	2650		176.7		
	1447	Tetraethyl Lead (TEL) Sludge	[(i)aromatic hydrocarbon, (ii)TEL	(i)	(ii)	N		4		0.3	
6. Heavy Metal Solutions and Residuals	1111	Acidic Solution with Heavy Metals	[(i)mineral acids, (ii)heavy metals	N	(ii)	(i)	8455		563.7		
	1112	Acidic Solution with Other Metals and Non-Metals	[(i)mineral acids	N	N	(i)	4220		281.9		
	1113	Other Acidic Solutions	[(i)mineral acids	N	N	(i)	3171		211.4		
	1121	Alkaline Solution with Heavy Metals	[(i)caustic, (ii)heavy metals	N	(ii)	(i)	10569		704.6		
	1122	Alkaline Solution with Other Metals	[(i)caustic	N	N	(i)	528		35.2		
	1123	Other Alkaline Solutions	[(i)caustic, (ii)toluene	(ii)	N	(i)	3910		260.7		
	1131	Metal Finishing Solutions, Acid	[(i)mineral acids	N	N	(i)	1585		105.7		
	1132	Metal Finishing Solutions, Alkaline	[(i)ammonium hydroxide	N	(i)	N	528		35.2		
	1133	Spent Picle Liquor from Ferrous and Non-Ferrous Metals	[(i)sulphuric acid	N	N	(i)	2114		140.9		
	1141	Aqueous Solutions with Heavy Metals	[(i)pigments, (ii)heavy metals	N	(ii)	N	10569		704.6		
	1142	Aqueous Solutions with Other Metals	(none identified)	N	N	N	7398		493.2		Quantity estimated by OWMC
	1143	Aqueous Solutions with Reactive Anions	[(i)sodium salts, (ii)phenol, (iii)toluene	(iii)	(ii) (iii)	N	2642		176.1		
	1244	Photochemical Waste	[(i)photographic chemicals	N	N	N	528		35.2		
	1251	Tannery Wastes - Liquid	[(i)sodium chloride, (ii)chromates	N	(ii)	N	2114		140.9		
	1431	Heavy Metal Sludge	[(i)iron, (ii)zinc, (iii)calcium carbonate [(iv)sand	N	N	N	3805	12048	253.7	803.2	mostly sludge with high water content
	1433	Other Metal Sludges	[(i)alumina	N	N	N	2114		140.9		"
	1445	Plating or Metal Finishing Sludge	[(i)heavy metals	N	(i)	N	740	1374	49.3	91.6	"
	1523	Tank Bottom Sediments	[(i)aluminum, (ii)silica	N	N	N	1057		70.5		"

OWAC Waste Group	UCD	Description	Typical Components	Hazard due to: Flammability	Health	Corrosivity			Trucks/year Pumpable	Non-pumpable	Comments
7. Misc. Chemicals and Products	1145	Brine	(i)brine	N	N	N	11		6.7		
	1152	Inorganic Solid Chemicals	(i)caustic, (ii)fertilizer	N	N	(i)		2114		140.9	
	1243	Pharmaceuticals and Wastes	(i)cellulose, (ii)varsol, (iii)oil/grease	(ii) (iii)	N	N	62	115	4.1	7.7	
	1245	Off-Spec or Aged Organics	(i)PVC, (ii)petroleum wax	(ii)	N	N		442		29.5	
	1416	Ink Sludge	(i)pigment incl carbon, (ii)vegetable oil	(ii)	N	N	62	115	4.1	7.7	high water content
	1513	Laboratory Waste Chemicals	(i)acetone, (ii)ether, (iii)chloroform, (iv)caustic	(i) (ii)	(ii) (iii)	(iv)		177		11.8	may also contain acid
8. Paints and Organic Residuals	1254	Adhesives or Glue	(i)acetone, (ii)methylene chloride (iii)trichlorethane, (iv)hexanes	(i) & (iv)	(i) & (ii) (iii) & (iv)	N	221	221	14.7	14.7	
	1258	Waste Tar and Residues	(i)tar & asphalt	(i)	N	N		1943		129.5	
	1262	Latex Wastes	(i)latex, (ii)oil & grease, (iii)pigments & dyes	(ii)	N	N	292	150	19.5	10.0	high water content
	1454	Paint Sludge	(i)pigments, (ii)mineral spirits, (iii)resins	(ii)	N	N	442	1325	29.5	88.3	high water content
	1455	Paint Sludge without Heavy Metals	(i)pigments, (ii)mineral spirits, (iii)toluene	(ii) (iii)	(iii)	N	88	354	5.9	23.6	
9. Aqueous Solutions	1225	Aqueous Solution with Non-Halogenated Residues <10%	(i)toluene, (ii)mineral spirits, (iii)ammonia	(i) (ii)	(i) (iii)	N	1325		88.3		high water content
	1226	Aqueous Solutions with Halogenated Residues <10%	(none identified)	N	N	N	9		0.6		Quantity estimated by OWAC
	1227	Aqueous Solution with Non-Halogenated Residue >10%	(i)amines, (ii)toluene, (iii)solvents	(ii) (iii)	(i) (ii)	N	442		29.5		high water content
	1228	Aqueous Solutions with Halogenated Residues >10%	(none identified)	N	N	N	9		0.6		Quantity estimated by OWAC
10. Anion Complexes	1146	Solutions Containing Cyanide	(i)cyanides	N	(i)	N	634		42.3		high water content
	1147	Solutions Containing Sulfides	(none identified)	N	N	N	11		0.7		Quantity estimated by OWAC
	1446	Cyanide Bearing Sludge	(i)cyanides	N	(i)	N	211	211	14.1		sludge with high water content

OWMC Waste Group	UCD	Description	Typical Components	Hazard due to: Flammability	Health	Corrosivity		Tracks/year Pumpable	Non-pumpable	Comments
11. Sludges and Inorganic Residuals	115	Inorganic Solids	(i)sand (ii)clay (iii)sulphur	N	N	N		10569	784.6	
	163	Spent Catalyst	(i)alumina (ii)metal oxides	N	N	N		211	14.1	
	167	Other Inorganic Waste	(i)sand (ii)metal oxides	N	N	N		3171	211.4	
	417	Alum and Gypsum Sludges	(none identified)	N	N	N		105	7.8	Quantity estimated by OWMC
	441	Lime Sludges	(i)calc. hydroxide, carbonate, sulphate	N	N	N		3171	211.4	sludge with high water content
	443	Sulfac Sludge	(i)sulphur	N	N	N		11	0.7	sludge with high water content
	518	Dust Collector Wastes	(i)metal dusts (ii)NaCl (iii)CaO	N	(iii)	N		2114	140.9	
12. Pesticides and Herbicides	201	Pesticides and Wastes	(i)pesticides (ii)mineral spirits	(ii)	(i)	N	132	8.8		high water content
	532	Equipment and/or Containers Contaminated with Pesticides	(i)pesticides	N	(i)	N		44	2.9	
13. PCB Wastes	242	PCB Oils and High Strength (over 500 ppm) Liquids	(i)PCB's (ii)oil	(iii)	(i)	N		35	2.3	
14. Clean up Residuals	512	Spill Cleanup	(i)tar/asphalt (ii)sand	(i)	N	N		618	41.2	
	521	Spent Cartridge Filters	(i)cartridges/filterpapers (ii)pigments	(i)	N	N		618	41.2	
	528	Pathogenic Wastes	(none identified)	N	N	N		618	41.2	Quantity estimated by OWMC
	531	Contaminated Rags	(i)cotton (ii)oil/grease	(i) (ii)	N	N		618	41.2	

Hazard Group	% of Total	Trucks/year Pumpable	Trucks/year Non-pumpable
Flammable only, all classes except 1A	15.8	552	891
Health hazard only	14.8	1116	235
Corrosive only	10.1	779	141
Flammable plus Health Hazard	5.6	423	88
Flammable plus Corrosive	2.9	262	0
Health Hazard plus Corrosive	13.9	1268	0
Flammable, Health Hazard and Corrosive	0.1	0	12
No Hazard	36.7	1207	2171

Notes:

(i) All trucks are assumed to hold 15 cu. m. of waste

(ii) Flammable: requires source of ignition and will sustain flame in presence of air.

(iii) Health hazard: contains chemicals which have recognized toxicity.

(iv) Corrosive: pH<2 or >11

(v) Fire class 1A: covers flammable gases and liquids which are normally contained under pressure. None are expected.

(vi) Explosive: None will be shipped or accepted.

NON-HALOGENATED SOLVENTS, OILS AND SLUDGES — Group total=10255 tonnes/yr — % = 47.9

UCD #	289	289	289	455	288	446	214	282	454	454	454	263	Total
Tonnes per year --->	904	770	513	412	362	330	296	281	274	261	261	242	4907.
						Percentages							
Water	60	65	50		25			11	50		40		33.88
Oil & grease	10	25	50	25	75	85		75				5	28.89
Soaps & surfactants						15	75						5.54
Mineral spirits				25			15			90	30		9.40
Metal chips, grit etc.	1	10					10						2.36
Pigments				25					50	2	20		6.07
Resins				25						6	10		2.95
Solvents (EtOH, T, X, MEK etc)										2		15	0.85
Rubber								7					0.40
Carbon								7					0.40
Sulphur	1												0.18
Organic acids	28												5.16
Polyethylene waxes												80	3.94
													100.0

UCD categories covered:	Typical sources of waste
288, 289 & 454	Automobile parts manufacture
289	Steel works, Preparation of animal feed
214 & 454	Manufacture of paint & its ingredients
455	Manufacture of machinery
446	Manufacture of lubricants
282	Manufacture of tires
263	Manufacture of plastic products

Notes re. Spill Handling:

Since these wastes consist of mostly flammable, or at least combustible, materials, spills should be handled in a manner similar to that for such other commonly encountered materials as stove and residual fuel oils.

HALOGENATED WASTES	group total= 1716					% = 50.5
UCD #	211	247	446	212	213	Total
Tonnes per year --->	358	206	144	85	73	866
			Percentages			
Water		27			11	7.35
Trichloroethylene	30		50		6	21.23
Oil & grease	70		50		11	38.18
Resins		32		4		8.01
plastics		32				7.62
methylene chloride		3		8		1.50
Toluene		3		38		4.45
Acetone		3		47		5.34
Pigments				3	22	2.14
Varsol					44	3.69
Xylene					6	0.50
						100.0

UCD categories covered:	Typical sources of waste
211, 213 & 446	Fabricated metal products & machinery
212	Manufacture of paint & its ingredients
247	Manufacture of fiberglass products

Notes re. Spill Handling:

Since these wastes consist of mostly flammable, or at least combustible, materials, spills should be handled in a manner similar to that for such other commonly encountered materials as stove and residual fuel oils. Note however that toxic fumes may be released from some of these wastes in the event of a fire.

AQUEOUS ORGANIC WASTES group total= 6873 % = 51.5

UCD #	225	289	257	289	217	Total
Tonnes per year --->	964	769	755	577	473	3538
			Percentages			
Water	99	99	98	97	70	94.58
Ammonium hydroxide	0.5					0.14
Phenol	0.2		2			0.48
Silica, grit etc.	0.3					0.08
Oil & grease		1		1	2	0.65
Dimethyl terephthalate				2		0.33
Paint & ink pigments					15	2.01
Resins					3	0.40
Solvent (MEK)					10	1.34
						100.0

UCD categories covered:	Typical sources of waste
217	Manufacture of machinery
225	Manufacture of mineral wool
257	Manufacture of lubricants
289	Aluminum casting, synthetic fibres

Notes re. Spill Handling:

No significant hazard is associated with these wastes.

INORGANIC ACIDIC WASTES group total=19844 % = 51.5

UCD #	111	112	133	113	111	Total
Tonnes per year --->	3717	2265	1476	1453	1301	10212
			Percentages			
Mineral acids (H2SO4 etc)	10	1	8	77	40	21.07
Water	89	99	90	23	50	77.00
Heavy metals	1				10	1.64
Ferrous sulphate			2			0.29
						100.0

UCD categories covered:	Typical sources of waste
111	Refining of non-ferrous metals
112	Manufacture of glass products
113	Manufacture of toiletries
133	Steel works

Notes re. Spill Handling:

All of these wastes are acidic and the appropriate precautionary measures, including neutralization, should be taken.

INORGANIC ALKALI/NEUTRAL WASTES group total=43093 % = 47.5

UCD #	441	141	441	123	123	143	143	Total
Tonnes per year --->	10014	4226	1665	1583	1029	1005	966	20488
				Percentages				
Water	90	99	86.5	95	90.4	68.5	75	90.22
Calcium hydroxide	10		10	0.5				5.74
Calcium carbonate			1					0.08
Magnesium hydroxide			1					0.08
Caustic					7.7			0.39
Sodium salts						30	0.5	1.50
Silica & inerts			1	3.5				0.35
Silver		0.2						0.04
Copper		0.2						0.04
Organic acids		0.2						0.04
sulphuric acid		0.2						0.04
ammonium hydroxide		0.2						0.04
Ammonium chloride							20	0.94
Ferro-alloy			0.5					0.04
Styrene				0.5				0.04
Acrylonitrile				0.5				0.04
Toluene					1.3	1	4	0.30
Phenol					0.6	0.5	0.5	0.08
								100.0

UCD categories covered:

123
123 & 143
141
441

Typical sources of waste

Manufacture of plastic products
Industrial organic chemicals
Manufacture of glass products
Manufacture of industrial gases

Notes re. Spill Handling:

No significant hazard is associated with these wastes.

CHROMATE WASTES	group total= 8277				% = 77.7	
UCD #	251	141	431	121	431	Total
Tonnes per year --->	2114	1859	1456	677	324	6430
			Percentages			
Water	96	99	90	97	95	95.56
Chromate	2	0.3	3	1	0.5	1.55
Sodium chloride	2					0.66
Nickel		0.3			0.5	0.11
Iron		0.4			2	0.22
Zinc			1			0.23
Phosphate			1			0.23
Nitrite/nitrate					2	0.10
Caustic				2		0.21
Oil & grease			5			1.13
						100.0

UCD categories covered:	Typical sources of waste
121	Steel works
141	Electroplating operations
251	Tanneries
431	Manufacture of motor vehicle parts

Notes re. Spill Handling:

Chromates must be prevented from entering any water course, otherwise no significant hazard is associated with these wastes.

CYANIDE WASTES	group total= 848				% = 72.1	
UCD #	146	146	146	444	146	Total
Tonnes per year --->	208	166	146	70	21	611
	Percentages					
Water	95	98.6	98	90	89.5	95.93
Cyanide	2	1	1	1	7.5	1.56
Caustic					1.5	0.05
Zinc	2			3		1.02
Cadmium	1					0.34
Copper		0.2	1	3	1.5	0.69
Nickel		0.1				0.03
Tin		0.1		3		0.37
						100.0

UCD categories covered:	Typical sources of waste
146	Electroplating operations, mfr of electronic components
444	Manufacture of tools

Notes re. Spill Handling:

Cyanides must be prevented from entering any water course, and care must be taken to avoid contact with acidic materials, otherwise no significant hazard is associated with these wastes.

NON-PUMPABLE - ORGANIC group total=17806 % = 50.0

UCD #	284	261	283	283	283	454	252	258	Total
Tonnes per year --->	1766	1416	1298	1162	1067	917	636	635	8897
				Percentages					
Water				50		43	74		16.25
Oil & grease	25			10	10				7.47
Grit, silica, glass	75	50	30		45				32.62
Resins		50	30			30			15.43
Esters						3			0.31
Metals and metal oxides				40	45	2	2		10.97
Aromatic hydrocarbons						2			0.21
Pigments						20			2.06
Paper and cellulose			40					40	8.69
Tar/asphalt								50	3.57
Calcium carbonate							6		0.43
Calcium hydroxide							3	10	0.93
Leather							15		1.07
									100.0

UCD categories covered:	Typical sources of waste
252	Leather tanning & finishing
258	Manufacture of paper products
261	Manufacture of plastic auto parts
283	Petroleum refining
284	Manufacture of lubricants
454	Truck & bus body manufacture

Notes re. Spill Handling:

Since these wastes consist of mostly combustible materials, spills should be handled in a manner similar to that for other combustible materials such as waste paper, lumber and paints.

NON-PUMPABLE - INORGANIC group total=31238 % = 60.8

UCD #	431	151	151	167	152	Total
Tonnes per year --->	9383	3631	2179	1900	1899	18992
			Percentages			
Silica, clay	1	97		50		24.04
Furfural		1				0.19
Formaldehyde		1				0.19
Toluene		1				0.19
Sulphur			30		0.5	3.49
Lead			15			1.72
Copper			20			2.29
Iron			20			2.29
Metals	6			50		7.97
Anhydrides					0.5	0.05
Ammonium nitrate					34	3.40
Ammonium phosphate					34	3.40
Urea					30	3.00
Calcium carbonate	43					21.24
Water	50		15		1	26.52
						100.0

UCD categories covered:	Typical sources of waste
151	Iron foundries
152	Synthetic fertilizer
167	Aluminum foundries
431	refining of non-ferrous metals

Notes re. Spill Handling:

No significant hazard is associated with these wastes.